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Chairman Klein

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United States Government Accountability Office
Washington, DC 20548

JAN 19 2007

The Honorable Dale E. Klein
Chairman
Nuclear Regulatory Commission

Dear Mr. Chairman:

Enclosed is a copy of our report entitled *Human Capital: Retirements and Anticipated New Reactor Applications Will Challenge NRC's Workforce* (GAO-07-105). This report discusses the commission's efforts to recruit, develop, and retain the workforce it will need to fulfill its regulatory mission.

This report contains recommendations to you. As you know, 31 U.S.C. 720 requires the head of a federal agency to submit a written statement of the actions taken on our recommendations to the Senate Committee on Homeland Security and Governmental Affairs and the House Committee on Government Reform not later than 60 calendar days from the date of this letter and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 calendar days after that date. Because agency personnel serve as the primary source of information on the status of recommendations, we request that you also provide us with a copy of your agency's statement of action to serve as preliminary information on the status of open recommendations.

We appreciate the assistance and cooperation of your staff during our review.

Sincerely yours,

Jim Wells
Director, Natural Resources
and Environment

Enclosure

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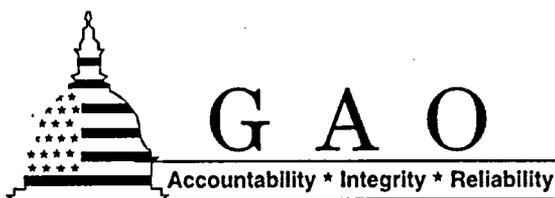
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Report to the Subcommittee on Oversight
of Government Management, the Federal
Workforce, and the District of Columbia,
Committee on Homeland Security and
Governmental Affairs, U.S. Senate

January 2007

HUMAN CAPITAL

Retirements and Anticipated New Reactor Applications Will Challenge NRC's Workforce





Highlights of GAO-07-105, a report to the Subcommittee on Oversight of Government Management, the Federal Workforce, and the District of Columbia, Committee on Homeland Security and Governmental Affairs, U.S. Senate

Why GAO Did This Study

The Nuclear Regulatory Commission (NRC) is responsible for licensing and inspecting the nation's nuclear power plants to ensure their safety and security. By 2010, about one third of NRC's workforce with mission-critical skills will be eligible to retire. At the same time, NRC's workforce needs to expand because NRC expects to receive at least 20 applications for 29 new nuclear power reactors beginning in October 2007. GAO assessed NRC's ability to meet its workforce needs by examining the extent to which NRC (1) has aligned its human capital planning framework with its strategic mission and programmatic goals; (2) is effectively recruiting, developing, and retaining critically skilled personnel; and (3) is addressing future uncertainties that could affect its overall workforce capacity. GAO examined strategic workforce planning and implementation documents, interviewed cognizant managers on NRC's human capital framework and activities, and surveyed these managers about NRC's human capital flexibilities and measures.

What GAO Recommends

GAO is recommending that NRC better (1) integrate its strategic human capital planning with its operations and (2) evaluate the effectiveness of its human capital flexibilities and measures. In commenting on a draft of the report, NRC agreed with GAO's recommendations.

www.gao.gov/cgi-bin/getrpt?GAO-07-105.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Jim Wells at (202) 512-3841 or wellsj@gao.gov.

HUMAN CAPITAL

Retirements and Anticipated New Reactor Applications Will Challenge NRC's Workforce

What GAO Found

NRC's human capital planning framework is generally aligned with its strategic goals and coherently identifies the activities needed to achieve the following strategic human capital outcomes: (1) continuous improvement in leadership and management effectiveness in delivering the mission and (2) a diverse, skilled workforce and an infrastructure that fully supports the agency's mission and goals. To integrate its human capital planning with implementation activities, NRC has recently completed or drafted three key planning documents and created a Human Capital Council in July 2006. However, it is too soon to tell whether implementation of these initiatives will stimulate, for example, the rate of knowledge transfer necessary for new staff to gain the critical skills they need to perform their regulatory responsibilities.

NRC has been effective in recruiting, developing, and retaining a critically skilled workforce to date, yet it is unclear whether this trend will continue in the next few years. For example, through improving such processes as how it implemented hiring for 60 different vacancy postings, NRC brought 371 employees on board during fiscal year 2006—a substantially higher number than in previous years. Similarly, NRC filled several critical skills gaps in 2006, yet it also identified many more new gaps in 2007 that require significant new hiring or training to fill. NRC has used various targets and measures to monitor its human capital progress, but could improve their application by gathering, analyzing, and sharing information about their usefulness among NRC's offices and revising some of them. Similarly, NRC may miss opportunities to most effectively apply human capital funding to recruit, develop, and retain a critically skilled workforce because NRC evaluates only some of its human capital flexibilities, such as recruitment incentives, in terms of the frequency and cost of their use.

NRC has acted to address two key uncertainties that affect its workforce needs: whether it can (1) maintain its workforce in the face of future competition for critically skilled workers and (2) accurately gauge its future workload. To better compete for workers, NRC tracks salaries in key disciplines to discern trends and is enhancing its university recruiting efforts. To handle the expected growth in reactor license applications, NRC has developed staffing and resource estimates, is reorganizing its affected workforce, and completed many elements of its review process for new reactors. Because of its workforce changes and anticipated increased workload, NRC needs flexibility, staff commitment, and sustained human capital management to adapt to any workforce climate shifts. Similarly, workload imbalances among employees and across offices could undermine employee satisfaction, making the recruiting and retention of a diverse, skilled workforce more difficult as expected industry competition intensifies. A failure to achieve these human capital goals could potentially hinder NRC's ability to inspect existing reactors and license new ones, which might ultimately limit the availability of electricity in the U.S. market.

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Abbreviations

ABWR	Advanced Boiling Water Reactor
CDMP	Comprehensive Diversity Management Plan
COL	combined license
DCRA	design-centered review approach
DOE	Department of Energy
EPR	Evolutionary Pressurized Water Reactor
ESBWR	Economic Simplified, Boiling Water Reactor
FTE	full-time equivalent
IG	Inspector General
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation
NSIR	Nuclear Security and Incident Response
NTEU	National Treasury Employees Union
OHR	Office of Human Resources
OPM	Office of Personnel Management
SES	Senior Executive Service
SWP	strategic workforce planning

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G A O

Accountability • Integrity • Reliability

United States Government Accountability Office
Washington, DC 20548

January 17, 2007

The Honorable Daniel K. Akaka
Chairman
The Honorable George V. Voinovich
Ranking Minority Member
Subcommittee on Oversight of Government Management,
the Federal Workforce, and the District of Columbia
Committee on Homeland Security and Governmental Affairs
United States Senate

The Nuclear Regulatory Commission (NRC) licenses and regulates civilian uses of nuclear materials to protect public health, safety, and the environment and promote the common defense and security. In particular, NRC is responsible for overseeing the electric power industry's 103 operating nuclear reactors that generate about 20 percent of the nation's electricity by inspecting their operations and reviewing license applications to, for example, extend reactors' operating lives. Since October 2005, many electric power companies have announced their intent to apply to NRC for licenses to build and operate at least 29 new nuclear power reactors, with project costs estimated to range from \$1.5 billion to \$4 billion. NRC expects to receive 8 applications by December 2007, 10 more applications by October 2008, and 2 additional applications by the end of September 2009—the first applications for construction licenses since the 1979 accident at the Three Mile Island nuclear power plant near Harrisburg, Pennsylvania. In addition, NRC is responsible for regulating the Department of Energy's (DOE) nuclear waste repository at Yucca Mountain near Las Vegas, Nevada, as well as medical, educational, and other uses of nuclear materials.

Congress appropriated about \$735 million for NRC's activities in fiscal year 2006. By law, NRC is required to recover about 90 percent of its budget authority each fiscal year, less certain specified amounts, through the fees it charges licensees and applicants. For fiscal year 2007, the Continuing Appropriations Resolution, 2007, would limit NRC's appropriation to the fiscal year 2006 level, and Congressional leaders have announced their intent to extend the Continuing Resolution for the full fiscal year, with few exceptions. In its comments on a draft of this report, NRC states that the funding in the Continuing Resolution would result in a \$95 million reduction in funding compared with the amount that the full House of Representatives and the Senate Committee on Appropriations

had approved for fiscal year 2007. According to NRC, the agency has begun to feel the impact of the Continuing Resolution's restrictions on funding and full-time equivalent positions. NRC believes that these restrictions, if extended for a protracted period, will seriously imperil its ability to meet its human capital goals and will significantly delay its preparedness to review applications for new nuclear power reactors. NRC cites as an example that the agency would significantly curtail, and possibly cease, its fiscal year 2007 new hiring, except for those already given offers and those necessary for the most critical of skills. NRC also believes that the effects will cascade into future years.

To fulfill its regulatory mission and help sustain public confidence in the safety of nuclear power, NRC needs a critically skilled workforce of scientists, engineers, and other employees with specialized knowledge, skills, and technical expertise. However, NRC expects that the demographics of its workforce will significantly change in the next few years, primarily because of two factors. NRC estimates that the percentage of employees eligible to retire will grow from the current level of about 16 percent to about 33 percent of the workforce in fiscal year 2010. (See app. I for demographics data on NRC's workforce.) Nuclear power plant owners and NRC have expressed concerns about their ability to even maintain their workforces at current levels to ensure the safety of existing plant operations and the rigor of inspections as workers retire and reactors age. Furthermore, at the same time, NRC projects that its workforce size will need to grow from about 3,100 employees in early fiscal year 2006 to nearly 4,000 employees by 2010 to meet the significant anticipated upsurge in workload demands as NRC begins to review power company applications for permits to construct and operate new nuclear reactors. To replace retiring employees and expand its workforce, NRC must hire from 300 to 400 employees per year through at least 2010.

In August 2004, NRC issued its *Strategic Plan, Fiscal Year 2004-Fiscal Year 2009*, which identifies the agency's vision; mission; values; and five goals—safety, security, openness, effectiveness, and excellence in agency management—shaping its activities through 2009. The strategic plan states that one of NRC's greatest management challenges will be to acquire, develop, and sustain a highly skilled and diverse technical workforce. Similarly, during the past 6 years, NRC's Inspector General (IG) has identified human capital management as a key challenge. To address these concerns, NRC developed the *2004-2009 Strategic Human Capital and*

Workforce Restructuring Plan (2004 strategic human capital plan), which presents strategies to ensure that the agency can recruit, develop, and retain the critically skilled workforce it needs.¹ In recent years, NRC was identified as the federal government's third-best organization to work through an analysis of the Office of Personnel Management's (OPM) 2004 *Federal Human Capital Survey* data,² and NRC improved its performance in 16 of 18 categories measured by its own 2005 *Safety Culture and Climate Survey* (NRC's 2005 employee survey) categories.

Our December 2003 report on effective strategic workforce planning identified two critical elements: (1) aligning an organization's human capital program with its current and emerging mission and programmatic goals and (2) developing long-term strategies for acquiring, developing, and retaining staff to achieve program goals.³ The first element involves linking human capital management strategies with agency mission, goals, and organizational objectives and integrating these strategies into its strategic plans, performance and accountability plans, and budget requests. The second element involves undertaking workforce planning activities to implement acquisition, development, and retention programs. Strategic workforce planning involves systematic assessments of current and future human capital needs and the development of long-term strategies to fill any gaps. Our previous work suggests that, regardless of an agency's mission, needs, and approach, strategic workforce planning should incorporate the five key principles shown in table 1.

¹Recruiting, developing, and retaining activities include (1) identifying, recruiting, and hiring new personnel; (2) staffing, developing, and training new and existing personnel; and (3) transferring or managing the knowledge for, and retaining sufficient numbers of, critically skilled personnel.

²The Partnership for Public Service and American University's Institute for the Study of Public Policy Implementation conducted the 2004 study.

³GAO, *Human Capital: Key Principles for Effective Strategic Workforce Planning*, GAO-04-39 (Washington, D.C.: Dec. 11, 2003); and OPM, *Human Capital Assessment and Accountability Framework* (Washington, D.C.: 2006).

Table 1: GAO's Strategic Workforce Planning Principles and Descriptions

Principle	Description
Involve top management, employees, and other stakeholders in developing, communicating, and implementing the strategic workforce plan.	Agencies' top program and human capital leaders set the overall direction, pace, tone, and goals and involve employees and stakeholders in establishing a communication strategy that creates shared expectations for the outcomes of the process.
Determine the critical skills and competencies that will be needed to achieve future programmatic results.	Agencies determine how many personnel have the skills and competencies needed to meet program goals and how many are likely to remain with the agency over time, given retirement and other attrition. Such analysis allows agencies to identify the resources needed to achieve current and future goals.
Develop strategies that are tailored to address gaps and human capital conditions in critical skills and competencies that need attention.	Agencies use strategies, including programs, policies, and practices, to address how the workforce is acquired, developed and trained, compensated; deployed; motivated; and retained. Such strategies help an agency move from the current to the future workforce.
Build the capability needed to address administrative, educational, and other requirements important to support workforce strategies.	Agencies educate managers and employees about available human capital flexibilities so that the flexibilities are implemented openly, fairly, and effectively.
Monitor and evaluate the agency's progress toward its human capital goals and the contribution that human capital results have made toward achieving programmatic goals.	Agencies use periodic measurement and evaluation to obtain data for identifying shortfalls and revising future workforce planning efforts. Gathering this information helps ensure that human capital strategies work as intended.

Source: GAO.

Given the anticipated increase in NRC's future workload, we assessed NRC's ability to sufficiently recruit, develop, and retain the staff it needs to inspect the operations of existing nuclear power plants, review the license applications for constructing new reactors, and perform other regulatory functions. Specifically, we examined the extent to which NRC (1) has aligned its human capital planning framework with its strategic mission and programmatic goals; (2) is effectively recruiting, developing, and retaining critically skilled personnel; and (3) is taking steps to address future uncertainties that could affect its overall workforce capacity.

To assess the alignment of NRC's human capital framework with its strategic mission and programmatic goals, we analyzed a broad range of NRC's policy, planning, and implementation documents; reviewed budget documents and performance and accountability reports; and interviewed cognizant managers in NRC's Office of Human Resources (OHR), program offices—including Nuclear Reactor Regulation (NRR), and four regional offices. To assess NRC's efforts to recruit, develop, and retain critically skilled personnel, we applied our five strategic workforce planning principles. In doing so, we analyzed NRC's (1) demographics data; (2) critical skills information; (3) implementation of its recruiting, hiring,

training and development, and retention strategies; (4) implementation of new systems, programs, and processes that support human capital management and planning; and (5) measures of its progress and results. We also surveyed 45 NRC managers in OHR, NRR and other program offices, and four regional offices about the use of existing human capital flexibilities, authorities, tools, and programs; our response rate was 71 percent. To assess the extent to which NRC has addressed future uncertainties that could adversely affect its overall workforce capacity, we examined the engineering, science, and technology labor pool and NRC's efforts to prepare for a surge in new reactor license applications. Specifically, we interviewed NRC managers and Nuclear Energy Institute (NEI) executives about the supply and demand for critically skilled workers, examined NRC's efforts to develop a "pipeline" for recruiting these personnel, and assessed its need for any new flexibilities and authorities. (See app. II for additional information about our scope and methodology.) We conducted our work from March through December 2006 in accordance with generally accepted government auditing standards.

Results in Brief

NRC's human capital planning framework is generally aligned with its strategic outcomes and goals. NRC's strategic plan and associated plans coherently outline its human capital goals, strategies, performance measures, and activities, and these elements are linked to NRC's strategic outcomes: (1) continuous improvement in NRC's leadership and management effectiveness in delivering the mission and (2) a diverse, skilled workforce and an infrastructure that fully supports the agency's mission and goals. Although its framework is generally sound, NRC has not fully implemented three key plans that would facilitate the recruitment and development of employees who its offices need to maintain agency expertise and to respond to anticipated growth in applications for reactor licenses in the next few years. For example, NRC's 2004 strategic human capital plan called for annual agencywide human capital implementation plans beginning in October 2005 that would link NRC strategies to its offices' tactical planning for accomplishing yearly goals. However, NRC has drafted but has not completed its first annual implementation plan, in part because of competing human capital demands particularly the need to achieve its sharply increased hiring targets. Without the plan, NRC managers face increased complexity and difficulty in managing activities to recruit and develop the critically skilled employees they will need. Similarly, although NRC recently completed two agencywide strategic documents for knowledge management and training and development, it remains to be seen whether NRC managers' implementation of these

initiatives will stimulate, for example, the rate of knowledge transfer necessary for new staff to gain the critical skills they need to perform their regulatory responsibilities. In addition, although NRC created a Human Capital Council in July 2006 to formulate and integrate strategies for NRC's offices to address human capital challenges, it is too early to determine whether the council can balance its responsibility both to develop solutions and to provide strategic direction for effectively addressing these key challenges. Accordingly, we are recommending that NRC take actions to better integrate its strategic human capital planning into its implementation activities. NRC agreed with our recommendation.

NRC has been effective in recruiting, developing, and retaining a critically skilled workforce to date, and has taken several actions in 2006 to increase its overall workforce capacity, but because NRC has not fully implemented some of its planned efforts to enhance its hiring and training, it is unclear whether this performance will be sustained. NRC has addressed our five key principles for strategic workforce planning and has used its human capital tools, authorities, and flexibilities to recruit, develop, and retain the critically skilled workers it needs; however, the agency has not evaluated the effectiveness of some of these flexibilities. For example, its leadership and management have been extensively involved in establishing, communicating, and implementing workforce planning strategies. NRC also has developed a process that inventories existing critical skills and compares them with needs to identify gaps. Furthermore, NRC uses many targets and measures to monitor the status of its efforts, such as the composition of its hires and separations. As a result, during fiscal year 2006, NRC exceeded its initial goal of hiring 300 new staff by bringing 371 employees on board, which was substantially higher than in previous years. Of these new workers, 54 percent were midlevel hires—many with nuclear industry experience—who typically require less training before performing their jobs than entry-level hires from universities.

Although NRC has strengthened its efforts to identify and fill critical skills gaps, it is too early to assess the effectiveness of some strategies that were put into practice during fiscal year 2006. For example, NRC closed about 55 critical skills gaps but identified 115 additional critical skills gaps, many of which will require 1 year or more of classroom and on-the-job technical training to fill. NRC also does not systematically evaluate its use of human capital authorities and flexibilities—such as recruitment incentives or early replacement hiring—for recruiting, developing, and retaining a critically skilled workforce, although it tracks the frequency of use and associated costs for some of these authorities and flexibilities. Without this information, NRC may either under- or over-use certain authorities

and flexibilities and inefficiently use its annual human capital funding. In addition, NRC managers told us that while some human capital measures and targets are reliable and useful, others do not provide sufficiently meaningful information to assess progress. NRC planned in 2004 to develop a human capital accountability system plan that, in part, would describe the measures, metrics, and associated targets needed to assess its achievement of human capital outcomes; this plan has not yet been drafted. Without this framework, it is difficult for offices to identify useful practices and improve agencywide understanding of how human capital activities directly support the achievement of agency goals and strategic outcomes. Furthermore, although NRC has previously surveyed employees about their satisfaction with its human capital program, the agency does not plan to conduct a survey during fiscal year 2007 even though doing so could provide a useful, updated perspective in assessing initiatives as NRC continues to expand its workforce. Accordingly, we are recommending that NRC take actions to evaluate (1) the effectiveness of its use of human capital tools, authorities, and flexibilities and (2) the usefulness of its human capital measures; intended outputs; and targets for recruiting, developing, and retaining a critically skilled workforce. We are also recommending that NRC survey its employees during fiscal year 2007 about their satisfaction with its human capital program, including new initiatives and offices' use of flexibilities to maintain a quality work environment. NRC agreed with our recommendations.

NRC has acted to address two key uncertainties that affect its workforce needs—that is, whether it can (1) maintain its workforce in the face of future competition with the nuclear power industry for critically skilled workers and (2) accurately gauge its workload, particularly for reviewing license applications for new nuclear reactors, during the next 3 years so it can meet its commitments for timely reviews while ensuring nuclear power plant safety and security. Regarding its ability to continue to attract and retain key personnel, NRC annually tracks the number and salaries of U.S. scientists and engineers in a few key disciplines to discern shifting trends. NRC also has initiated additional activities, authorized by the Energy Policy Act of 2005, to support key university programs to attract greater numbers of students into mission-critical skills areas, and to offer scholarships to those studying in these fields. Such activities have the potential to enhance the quality of NRC's entry-level candidate pool with a pipeline of critically skilled candidates. Nevertheless, NRC will face greater competition in attracting and retaining experienced scientists and engineers, and, further complicating matters, NRC generally employs only U.S. citizens in these positions. Regarding the anticipated growth of license applications for new reactors, NRC expects to complete its review

of applications within 42 months, including holding required public hearings. Although NRC's process is intended to allow for a more efficient review of combined license applications and is generally supported by the nuclear power industry, it is as yet untested. In addition, in anticipation of receiving an initial wave of applications in October 2007, NRC has periodically met with power company representatives to discuss and resolve matters related to how the process is to move forward.

Background

The Energy Reorganization Act of 1974 established NRC as an independent agency, headed by a five-member Commission, to regulate the nation's civilian use—commercial, industrial, academic, and medical—of nuclear energy and materials, including nuclear power reactors and research and test reactors.⁴ NRC's mission is to ensure that civilian users of nuclear materials adequately (1) protect public health and safety; (2) promote the common defense and security, including securing special nuclear materials against radiological sabotage and theft or diversion; and (3) protect the environment. NRC's total operating budget, excluding the IG's office, grew from about \$618 million in fiscal year 2004 to about \$735 million in fiscal year 2006.⁵ While NRC requested about \$808 million for fiscal year 2007, the Continuing Appropriations Resolution, 2007, limits its appropriations to the fiscal year 2006 funding level. Similarly, NRC's funding allocations for recruiting, training, and other human capital activities have grown from a total of \$35 million, or 6 percent of its total

⁴Pub. L. No. 93-438.

⁵NRC is required by law to recover through fees about 90 percent of its budget authority each fiscal year, less certain specified amounts. Under the Omnibus Budget Reconciliation Act of 1990 (OBRA-90), as amended, the fee recovery requirement was about 100 percent in fiscal years 1991 through 2000, and gradually reduced to 90 percent in 2006. The Energy Policy Act of 2005 permanently extended NRC's 90-percent fee recovery requirement beginning in fiscal year 2007. NRC collects license and inspection fees under the authority of the Independent Offices Appropriation Act of 1952, known as the User Charge Statute, 31 U.S.C. § 9701. NRC collects "annual fees"—generic and other regulatory costs not covered by the license and inspection fees—under the authority of OBRA-90, as amended. Operators of federally owned research reactors are exempt from paying fees if the reactors are used primarily for educational training and research and meet certain technical design criteria. See 71 *Fed. Reg.* 30722, 30732 (May 30, 2006).

operating budget, in fiscal year 2004 to about \$61 million, or 8 percent of its planned allocations, in fiscal year 2007.⁶

About 70 percent of NRC's workforce in fiscal year 2006 was dedicated to ensuring the safe and secure operation of civilian nuclear power reactor facilities and research and test reactors. NRC estimates that at least 500 new critically skilled positions will be added through fiscal year 2009, primarily to license and inspect the construction of new reactors. (See app. III for more information on NRC's new reactor licensing process.) NRC's reactor safety activities and their related percentages of NRC's workforce include the following:

- reactor licensing: power upgrades (approving increases in the allowable level of generated power) and license transfers, operator licensing, regulation development, operating experience evaluation, and financial assurance (25 percent of NRC's workforce);
- reactor license renewal (3 percent);
- new reactor licensing (6 percent);
- reactor inspection and performance assessment: emergency preparedness and incident response, reactor technical and regulatory training, imposition of enforcement sanctions for violations of NRC requirements, and investigation of alleged wrongdoing by licensees, applicants, contractors, or vendors (30 percent);
- homeland security activities: threat assessment, safeguards and security reviews and inspections, force-on-force exercises, and regulatory infrastructure (5 percent); and
- international efforts to enhance domestic and global nuclear safety (1 percent).

⁶NRC uses OPM's *Human Capital Assessment and Accountability Framework* categories to organize its human capital budget. In fiscal year 2006, three human capital budget categories—talent, results oriented performance culture, and leadership and knowledge management—contained over 25 items and accounted for nearly \$40 million and over 90 full-time equivalent (FTE) positions. In addition, strategic alignment, accountability, and workforce planning/deployment were assigned 2 FTE positions.

In fiscal year 2006, about 28 percent of NRC's workforce was devoted to the following nuclear materials and nuclear waste safety activities to secure the use and management of radioactive materials:

- nuclear fuel cycle facilities (6 percent of NRC's workforce);
- nuclear materials activities (10 percent);
- repository or disposal of high-level waste—specifically, licensing decisions and regulatory oversight (4 percent);
- decommissioning of nuclear reactors and other facilities, and low-level waste management (almost 4 percent); and
- storage and transportation of spent nuclear fuel both at and away from reactor sites (almost 4 percent).

NRC estimates little growth in the number of personnel committed to these activities, with some slight increases related to fuel cycle production facilities and possibly high-level waste storage, depending upon DOE's submission of its license application for the Yucca Mountain repository.⁷ In fiscal year 2007, NRC expects to oversee more than 4,400 licenses for nuclear materials and nuclear waste safety, while 34 Agreement States will regulate and oversee over 18,000 licenses.⁸

⁷In July 2006, DOE announced its intention to submit its license application for the Yucca Mountain repository to NRC by June 30, 2008, and to initiate repository operations in 2017. DOE stated the 2017 opening date is a "best-achievable schedule" and is predicated upon enactment of new legislation.

⁸Under section 274(b) of the Atomic Energy Act, NRC has relinquished to the 34 Agreement States responsibility for licensing and regulating the use of source, by-product and certain quantities of special nuclear material within the state.

NRC's Human Capital Planning Framework Is Aligned with Its Strategic Mission and Programmatic Goals, but Some Further Actions Are Required

NRC's human capital planning framework is generally aligned with its strategic mission, outcomes, and programmatic goals; however, some key plans and activities are still being developed or implemented.

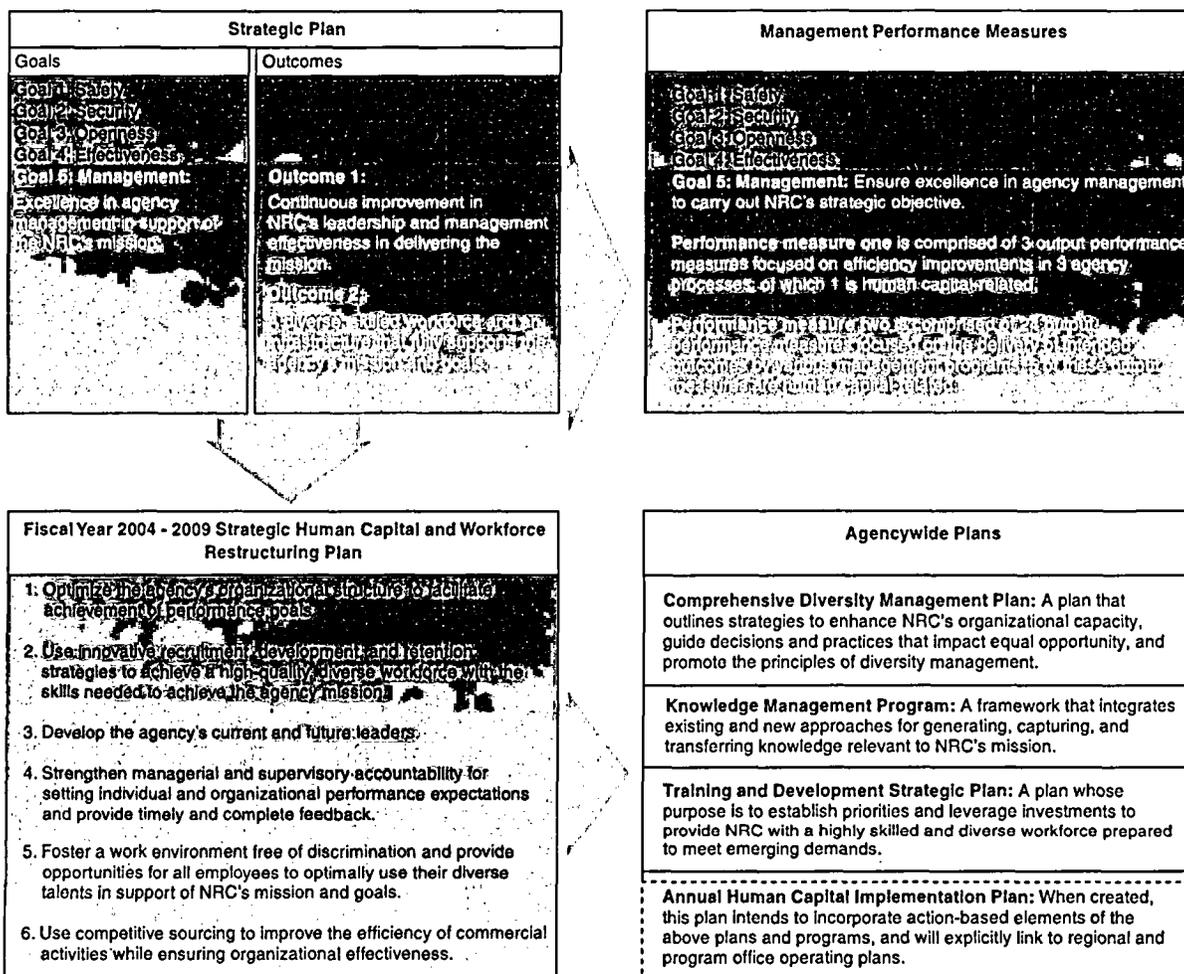
NRC's Strategic Human Capital Planning Framework Is Coherently Aligned

NRC's human capital planning framework has generally aligned human capital activities with NRC's management goal and the goal's strategic outcomes. NRC also has taken significant steps, particularly during fiscal year 2006, to ensure that human capital plans and strategies are demonstrated through its human capital activities by achievement of agencywide and office-specific goals and outcomes. In addition, NRC's strategic and existing operational planning documents link human capital goals and strategies to several agencywide performance measures.

A critical success factor for high-performing organizations is the alignment of their human capital initiatives with mission and goal accomplishment. Alignment is demonstrated by linking human capital management strategies with agency mission, goals, and organizational objectives and integrating these strategies into its strategic plans, performance and accountability plans, and budget requests. This linkage allows agencies to assess and understand the extent to which their workforce contributes to achieving the overarching mission.

As shown in figure 1, NRC's strategic human capital approach demonstrably supports the agency's organizational performance objectives. Together, NRC's plans and strategies, programs, and activities provide a coherent structure designed to support NRC's safety and security mission. Specifically, NRC's strategic plan outlines six human capital strategies that delineate how the agency will achieve its strategic outcomes of (1) continuous improvement in NRC's leadership and management effectiveness in delivering the mission and (2) a diverse, skilled workforce and an infrastructure that fully support the agency's mission and goals.

Figure 1: NRC's Strategic Human Capital Planning and Implementation Framework



Source: GAO analysis of NRC documents.

NRC has also taken significant steps to ensure that human capital plans and strategies are implemented to achieve agencywide and office-specific goals and outcomes. For example, NRC's 2004 strategic human capital plan delineates tools, authorities, flexibilities, and programs for hiring, developing, and retaining personnel, most of which NRC currently uses. The strategic human capital plan also directs the development of several additional plans, strategies, and activities—many of which have been put into place—to achieve the workforce needed to accomplish NRC's goals. NRC's strategic and existing operational planning documents also link

human capital goals and strategies to several agencywide performance measures, in part illustrated in its annual performance budget and accountability reporting.

Some Key Human Capital Planning and Implementation Efforts Are Still in Process

While NRC's planning framework delineates the relationship between human capital activities and strategic outcomes, some key plans are still being developed, completed, or put into practice. Although most of NRC's agencywide and office specific plans provide human capital management strategies, the linkage is not fully delineated between generally identifying strategies and selecting and deploying particular strategies.

An agency that is successful in aligning and integrating human capital approaches and goals considers further initiatives and refinements when organizational needs change or when successes or shortcomings of its human capital efforts are demonstrated.⁹ NRC is currently undergoing such a transition because the agency, both in terms of demographics and workload, will have increasing and diverse human capital needs in coming years. In response, during fiscal year 2006, NRC initiated a range of activities, in various stages of completion, intended to provide a more robust framework through which to operate during the next few years. For example:

- Since late 2005, NRC's four regional offices have developed or are further implementing human capital management plans that reflect their human capital activities. The general framework of these plans mirror NRC's 2004 strategic human capital plan.
- In August 2006, NRC adopted a more comprehensive approach to its knowledge management and knowledge transfer. NRC's prior approach to knowledge management did not fully support the agency's need for a faster rate of knowledge transfer to accommodate increasing retirements, midcareer turnover, agency growth, and the broader scope of knowledge needed, for example, to support new technologies and new reactor designs. NRC's new framework provides significant direction and detail regarding how knowledge management can be accomplished. However, it remains to be seen whether implementation of these initiatives will stimulate the rate of knowledge transfer necessary for new staff to gain the critical skills they need to perform their regulatory responsibilities.

⁹GAO, *Exposure Draft: A Model of Strategic Human Capital Management*, GAO-02-373SP (Washington, D.C.: March 15, 2002).

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- In fiscal years 2006 and 2007, NRC has been developing common measures for offices to monitor and evaluate performance in support of the goals in its *2004 Comprehensive Diversity Management Plan (CDMP)* to (1) recruit diverse employees at all levels, (2) develop and retain diverse employees by promoting an environment that values differences, and (3) increase the diversity of employees in senior and managerial positions. CDMP was designed to promote strategies that increase NRC's organizational capacity, guide decisions and practices that impact equal opportunity, and promote the principles of diversity management.
 - In early 2006, NRC developed a more detailed agencywide list of best practices strategies and actions for achieving equal employment opportunity goals through recruiting, staff development, merit process, inclusion and workforce culture, awards and recognition, communication, action tracking, and organization assessment. These best practices strategies and actions complement CDMP strategies.¹⁰
 - In September 2006, NRC finalized a strategic training and development plan to more specifically identify how existing efforts to ensure the effectiveness and efficiency of training will be augmented and integrated. The plan's goals are to enhance individual performance, meet agency needs, ensure resources are optimized, and confirm the extent to which NRC is realizing training benefits.
 - During fiscal year 2006, NRC identified inefficiencies in coordinating and integrating planning and operations, stretching its human capital resources to hire and meet the need for nearly double the number of new employees than in previous years. In part, NRC's intensified activity demonstrated that coordination among human resources and program offices, although considerable, was not yet optimized. In response, in July 2006, NRC created a Human Capital Council composed of office deputy directors and a deputy regional administrator to provide a senior leadership and programmatic perspective.¹¹ OHR chairs and supports the council, whose

¹⁰GAO, *Diversity Management: Expert-Identified Leading Practices and Agency Examples*, GAO-05-90 (Washington, D.C.: Jan. 14, 2005).

¹¹Our report entitled *Human Capital: Selected Agency Actions to Integrate Human Capital Approaches to Attain Mission Results*, GAO-03-446 (Washington, D.C.: April 11, 2003) found that Human Capital Councils are among the key actions agencies have taken to integrate human capital approaches with strategies for accomplishing agency missions. Generally composed of senior program and human capital managers, councils meet regularly to (1) review the agency's integration efforts; (2) ensure that strategies are visible, viable, and relevant; and (3) monitor whether human capital approaches are well considered, effectively contribute to outcomes, and are implemented equitably.

purpose is to provide an agency-level forum to formulate strategies to address human capital challenges, share best practices, and develop an integrated approach to address human capital issues. The council is expected to make recommendations for action to the Executive Director for Operations and Chief Human Capital Officer to improve the agency's management of human capital. The council also intends to identify ways by which OHR personnel can more proactively support program offices and solve problems. However, it is too early to determine whether the council can balance its responsibility to provide both strategic direction and develop an integrated approach for effectively addressing these key challenges.

- NRC has drafted but has not completed its first annual human capital implementation plan, in part because of the need to support competing human capital demands, particularly NRC's sharply increased hiring targets.¹² Similar to the aims of the Human Capital Council, the implementation plan would serve to link strategic planning to operational planning and implementation efforts. At least one program office, NRR, has developed such a plan, which both demonstrates alignment to NRC's 2004 strategic human capital plan and provides much more specificity on the means to achieve and implement human capital strategies. Without the plan, NRC managers face increased complexity and uncertainty in managing recruitment and development activities for the critically skilled employees they will need.

It is too soon to determine the extent to which these recent efforts, taken together or separately, will help NRC to more effectively respond both to continuing and new workforce demands during 2007 through 2010, and beyond. The urgency to incorporate strategic human capital management principles more explicitly into operations may vary across program offices, in part because of somewhat different program needs or requirements. Because key internal stakeholder commitment and involvement will dictate their success, the further development and use of these plans and activities are likely contingent on whether stakeholders consider them necessary and effective for integrating NRC's human capital activities and enable them to achieve the desired results.

¹²NRC's 2004 strategic human capital plan called for annual agencywide human capital implementation plans beginning in October 2005. Each annual plan would link NRC strategies to its offices' tactical planning for accomplishing yearly goals.

NRC Has Generally Been Effective in Recruiting, Developing, and Retaining Critically Skilled Employees, yet Many Activities Were Only Recently Initiated

To date, NRC's approach for recruiting, developing, and retaining a critically skilled workforce has generally been effective and addresses our five key principles for effective strategic workforce planning. NRC's implementation of its workforce planning strategies demonstrates significant agency focus on achieving a diverse, skilled workforce to meet anticipated workload demands that it foresees in the next few years. For example, NRC has estimated the skills and personnel it needs for new reactor licensing and exceeded its fiscal year hiring target by bringing on 371 new employees. However, because of substantial challenges facing NRC and because several efforts have not yet been fully put into practice, the framework's overall effectiveness in collectively enhancing NRC's overall workforce capacity is not fully clear. As a result, while NRC determined that it closed about 55 critical skills gaps in fiscal year 2006, it also identified 115 new gaps and 76 continuing or long-term gaps, many of which will take a significant amount of training and development to be considered filled. NRC has proposed to increase funding for leadership, training and development, and knowledge management by 37 percent in its fiscal year 2007 budget request in an effort to further close these gaps. In addition, NRC's use of its flexibilities could be further improved by systematically evaluating how they contribute to desired outcomes. Similarly, NRC could revise some of its measures, metrics, and targets to better target and gauge agency progress.

NRC's Management Is Significantly Engaged in Establishing, Communicating, and Implementing Strategic Workforce Planning Efforts and Strategies

Our prior work found that top leadership and management, when clearly and personally involved in workforce planning, can provide the organizational vision that is important in times of change, and can generate stability and cooperation within the agency to ensure that planning strategies are thoroughly implemented and sustained. With respect to our first principle, we found that over the past several years, NRC's top leadership has provided direction, and together with senior management, has become increasingly engaged in human capital management and strategic workforce planning.¹³ NRC's *2004-2009 Strategic Plan*, which introduced a management goal and objectives specifically for strategic human capital management, was developed through high-level collaboration among the Deputy Executive Directors for Operations, the Chief Financial Officer, the four regional administrators, and the directors of program offices and OHR.

¹³NRC's senior leadership includes its five Commissioners, Executive Director for Operations, and four Deputy Executive Directors.

Top leadership's involvement in strategic workforce planning and human capital activities is further evidenced through annual briefings to the Commissioners on human capital management; biannual briefings to the Commissioners on comprehensive diversity management; and the Commission's hosting of annual all-staff meetings, during which Commissioners communicate agency progress, discuss challenges the agency faces, and respond to employees' questions. During the past year, the Commissioners also solicited more information on, and provided more direction for, implementing such human capital activities as recruiting, hiring, and knowledge management. NRC managers generally told us that the agency's human capital approach plays a significant role in enabling NRC to attract, hire, and retain a diverse and skilled workforce. Overall, NRC's 2005 employee survey results showed that employee perceptions of management had improved since 2002; nevertheless, results also indicated that NRC management could further improve upon how it encourages employees to give their best.

In emphasizing the importance of succession planning, senior NRC managers also said the agency is active in identifying and developing its midlevel and upper-level managers and leaders. Our prior work has found that such activities can positively affect an agency's ability to increase the retention of high-potential employees, maintain sufficient leadership capacity as senior executives retire, and achieve a more diverse workforce. NRC continued and intensified its succession planning activities in 2006 in light of agency growth and reorganization with managers conducting efforts to determine the appropriate skills and leadership "fit" for Senior Executive Service (SES) positions and anticipating replacement needs in 2-, 4-, and 6-year time frames.¹⁴

Our prior human capital work also found that an organization's effective use of communications strategies promotes transparency, creates shared expectations, and enables improved progress reporting. Although from 2001 to 2005, NRC's IG identified intra-agency communications as one of the most serious challenges facing the agency, it removed this challenge in its 2006 report because of various actions NRC has taken to improve internal communications. In addition, NRC's 2005 employee survey results

¹⁴NRC's Executive Resources Board is responsible for defining and overseeing succession planning activities. It is chaired by the Executive Director for Operations and includes the four Deputy Executive Directors for Operations, the four Regional Administrators, and most of the NRC office directors.

demonstrated a significant improvement over the 2002 survey results. The steps that NRC has taken include the following:

- In response to a 2002 IG recommendation, NRC created a Communications Council in 2003. The council, which meets monthly, coordinates and launches internal communications initiatives, shares best practices, provides a forum for offices to advise and recommend further improvements, and posts meeting summaries to NRC's internal Web page.
- Management has promoted transparency by developing and disseminating key information on its human capital policies, procedures, and processes through management directives and "yellow announcements."¹⁵
- To create shared expectations and buy-in, OHR conducts periodic video teleconferences with regional offices' management, supervisors, and staff to explain new policies and procedures. OHR also provides other face-to-face training as needed, typically on new developments or major changes in human capital policies and procedures. For example, in 2006, OHR and the General Counsel partnered to conduct focused training on such topics as merit staffing, performance and conduct issues, and equal employment opportunity, which NRC plans to incorporate into its formal supervisory curriculum.
- The *NRC Reporter*, a weekly newsletter instituted in early 2005, provides employees with information on various agency initiatives, and an Executive Director for Operations Update, introduced in 2002, discusses operational activities on a weekly to biweekly basis.
- NRC's Web site and Agencywide Document and Access Management System also provide easy access to human capital materials, including transcripts of annual briefings, planning documents, and its "human capital management tool box."
- NRC routinely solicits feedback or comments from offices, employees, and the National Treasury Employees Union (NTEU) on the introduction of

¹⁵NRC traditionally used yellow paper to distribute official announcements to establish practices or procedures; introduce changes in policy, senior staff assignments, or organization; and address major agencywide events. NRC now maintains these "yellow announcements" on its intranet.

new or major changes to flexibilities, policies, and procedures.¹⁶

- NRC's 2005 employee survey results on NRC's Differing Professional Opinions Program, through which employees can provide alternative professional theories or opinions, demonstrated no statistically significant increase in this category's results since 2002, and NRC identified it as an area for improvement. A key senior manager also noted that concern still existed about this program yet encouraged its use, saying that such opinions and resulting discussions make NRC's organizational safety and security mind-set sounder.

Although NRC has demonstrated efforts in the above areas, opportunities exist to further enhance its capability to monitor and measure its human capital success and progress. We have found that leading organizations have periodically sought their employees' input and explicitly addressed that input to adjust their human capital approaches.¹⁷ One way agencies assess employee satisfaction and leadership and management practices that contribute to agency performance is through employee surveys. NRC's IG conducts its *Safety Culture and Climate Survey* every few years, the last being in 2005; NRC also participates in OPM's biannual *Federal Human Capital Survey*, most recently conducted in 2006. Even though (1) at least one third of its workforce will be directly affected by office reorganizations or expansions, (2) several key human capital efforts are to be further implemented, and (3) over 200 retirements or resignations are anticipated, NRC does not plan to conduct an employee survey during fiscal year 2007. Employee survey results could provide NRC managers with employees' feedback that could be used to adjust the human capital approaches as appropriate during this particularly critical year. Without such data as a key basis for understanding the workforce climate, it will be more difficult for NRC to gauge any shifting trends, determine strategies to address any problems, and report on actions it has taken to move forward.

NRC managers and a key NTEU official we interviewed said that their relationship, characterized as somewhat tenuous, could also be improved. NTEU officials told us that NTEU's influence had diminished somewhat in recent years because (1) since 2001, federal agencies are no longer

¹⁶NTEU estimates that 30 to 40 percent of NRC's workforce is eligible for NTEU membership, of which about 600 regularly pay dues.

¹⁷GAO-02-373SP.

required to establish partnerships with their labor organizations;¹⁸ (2) the union's own leadership style was not always conducive to effecting change; and (3) the union provided limited resources and incentives to stimulate active participation of its members. NTEU officials and NRC managers also had differing views on how to facilitate Agency Labor-Management Partnership Committee meetings between senior union officials and NRC managers, yet they agreed on the need to raise issues appropriate for committee consideration. NRC managers and NTEU officials told us that they plan to defer renegotiation of the NTEU contract until 2008, although they recognize NRC's work environment is rapidly changing.

NRC Analyzes Its Mission Priorities and Workforce Capacity to Identify Ongoing and Future Critical Skills Needs

Our prior work found that maintaining information on the critical skills and competencies that an organization's personnel possess is especially important for federal agencies operating in a changing environment.¹⁹ Shifts in national priorities, advances in technology, budget constraints, and other factors affect the critical skills an agency needs to fulfill its mission. NRC annually analyzes its workforce's skills by gathering data on employee skills and competencies, identifying the existing and future critical skills needed, and determining if and where gaps exist. As a result of this process, which has become increasingly institutionalized since 2002, NRC reviews its existing workforce characteristics, identifies ongoing and future critical skills needs, and tracks critical skills gaps. Engineers and scientists, who represent about half of the overall workforce, are the more evident of NRC's critically skilled population; however, NRC has identified the fields of contracting, law, security, and risk assessment, among others, as mission-critical skills. In addition, because of increased homeland security requirements, NRC's critical skill set has broadened in recent years to include more expertise in materials and reactor security, emergency preparedness, and incident response.

For NRC's annual critical skills assessment, (1) employees inventory their skills, competencies, and levels of expertise; (2) office and branch

¹⁸Although Executive Order 13203 (Feb. 17, 2001) revoked Executive Order 12871 (1993), which had directed that federal agencies establish such partnerships, NRC's Agency Labor-Management Partnership Committee has continued by mutual agreement of management and NTEU officials. In addition, several NRC offices have continued their labor-management partnerships with appropriate union officials.

¹⁹GAO-04-39.

managers assess the supply of and demand for general and particular skills; and (3) OHR personnel further analyze this information to determine agencywide critical skills needs. The primary tool NRC uses to gather detailed data on an employee's critical skills and competencies is its strategic workforce planning (SWP) system database, which was developed in 2002. The SWP system identifies the critical skills and competencies each employee possesses, his or her career stage, and his or her retirement eligibility dates. Supervisors, managers, or human resources personnel can then generate summary reports with a range of parameters. The SWP system's staff and critical skill matrix lists all staff in a given branch or office, and indicates each employee's skill level, title, retirement eligibility date, and years until retirement. OHR and program office managers told us that the SWP system's accessibility and utility have improved in the last 2 years. Some program managers noted that they have used SWP data to identify potential skills needs and gaps, to inform decisions when assigning work, and for succession planning. These managers noted that the SWP system requires recurring employee input and managerial and supervisory inputs and analysis to be effective. In 2006, over 80 percent of employees and supervisors updated their skills and anticipated needs, respectively.

In addition to gathering skills information, NRC has conducted an annual agencywide needs and gaps assessment since 2003. More specifically, program office managers assess the supply of and demand for general and particular skills in their offices and branches, given their existing and anticipated workload. The offices each identify their "most critical" needs.²⁰ They then categorize these needs as either near term (0 to 2 years) or long term (3 to 5 years), and their importance as either top tier or second tier. Then, OHR compiles these assessments, conducts further analyses, and reports the results to senior NRC managers and program offices. NRC's fiscal year 2006 analyses identified over 300 critical skills needs, over 100 of which were categorized as top tier.

In preparation for reviewing combined license (COL) applications for constructing and conditionally operating new nuclear reactors and plants, NRC has assessed the range and magnitude of critical skills needs. Specifically, NRC conducted a job-task analysis in early 2006 to better

²⁰NRC defines "most critical" skills as knowledge, skills, or abilities that will be in extreme demand in the specified planning period. Limited availability of a most critical skill would severely affect an office's ability to meet business requirements and/or mission demands.

define anticipated critical skills needs by identifying detailed tasks, competencies, and skills associated with prior reactor license application reviews. NRC managers determined that a large majority of skills associated with current licensing, regulatory, and technical expertise related to existing reactors are “portable” to the new reactor licensing reviews. These managers also identified a small number of new critical skills that are specific to new reactor licensing, such as hydrology and reactor physics. NRR then developed an initial resource estimate model that, in part, estimated critical skills needs by functional areas.²¹ Five skill sets—project management, civil engineering, instrumentation and controls, legal, and operator licensing—make up over 50 percent of the estimated effort, while about 17 other skill sets make up the remainder. In the summer of 2006, NRR retained a contractor to develop a master project management plan for project planning and scheduling that would (1) support NRC’s review of COL applications for constructing and conditionally operating a new reactor and (2) link critical skills needs to actual personnel, positions, and time frames. The plan, which will be completed in early 2007, will estimate how to phase, project manage, and staff each aspect of the reviews, on the basis of validation of initial estimates. NRR is also developing a transitional staffing plan to identify the employees who will work in NRR and in NRC’s newly established Office of New Reactors. (See app. IV for information about NRC’s recent workforce reorganization and expansion.) In doing so, these managers said that the combined use of the SWP system, the resource estimate model, and the project management plan will inform how NRR will reorganize its personnel into the two offices and allocate its resources.

NRC Primarily Uses Recruiting, Hiring, Training, and Development Strategies to Close Existing and Future Critical Skills Gaps

Our prior work has found that, to fill skills gaps, agencies need to develop human capital strategies and tools with the resources that are reasonably expected to be available. These strategies and tools encompass recruiting and hiring, training and developing staff and leadership, succession planning, knowledge management, and use of flexibilities. Agencies also need to align these strategies to eliminate gaps and optimize the contribution of current and future critical skills and competencies for mission success.

²¹NRR’s resource estimate model includes activities related to design certification. The new reactor licensing effort will also require skills and resources from OHR and the Offices of Administration, General Counsel, Nuclear Regulatory Research, Information Services, and Nuclear Security and Incident Response.

NRC Significantly Increased Its Recruiting and Hiring Efforts and Its Use of Certain Flexibilities in Fiscal Year 2006

NRC annually identifies critical skills gaps and develops strategies to address the gaps to achieve and maintain the level of expertise required to meet existing and anticipated workload demands. During the last 2 years, program office managers have relied on (1) recruiting and hiring and (2) training and development as their key gap closure strategies, among others. These also represent the majority of the tools, programs, authorities, and flexibilities NRC regularly employs as human capital strategies.

NRC's recruiting and hiring approach enabled the agency to exceed both its initial 2006 hiring target of 300 and its subsequent target of 350, by hiring 371 new employees who had reported as of September 30, 2006. NRC uses both general and specific vacancy announcements at the entry, mid, and upper levels that typically represent few to several critical skills areas in related disciplines and specialty areas.²² Fiscal year 2006 was the first year in over a decade that NRC's recruiting and hiring efforts were targeted at both replacing personnel leaving the agency and expanding its workforce—about half of the new hires replaced employees who left NRC through retirement or resignation and half increased NRC's total workforce to 3,347 employees.²³ In particular, NRC lost 75 employees—39 employees retired or resigned and 36 transferred to other NRC offices—but hired nearly 200 employees, to staff both existing and new reactor licensing work. NRC's fiscal year 2007 hiring needs represent over 25 critical skills areas, and represent general and specific engineering and science fields as well as security, intelligence, information technology, contract management, human resources, and project management fields.

NRC's approach is driven by the identification of critical skills needs and efforts to fill gaps, and includes the following activities:

- NRC's annual recruiting call projects the agency's needs to hire entry-level and experienced employees with critical skills in particular disciplines. The fiscal year 2006 recruiting included general and specific engineering and science fields, security, information technology, and contract management fields. NRC's recruiting program includes visits to

²²42 U.S.C. § 2201(d) authorizes NRC to set special pay rates for scientists and engineers that are higher than many other federal agencies seeking to attract similar talent. NRC's GG-5 to GG-11 grade levels are entry-level positions, and GG-13 and above grade levels are midlevel and upper-level positions.

²³NRC expects to hire about 1,300 employees between fiscal years 2006 and 2009, according to the IG.

universities and professional society organizations to identify highly qualified candidates.

- While the percentages vary somewhat from year to year, NRC generally brings on 60 to 70 percent of its new professional hires at the midlevel or upper level—frequently with several years of relevant professional experience—and the remainder of its hires at the entry level. About 200 of these hires—predominantly engineers, scientists, lawyers, human resource specialists, and contract specialists—came on at the midlevel or upper level in 2006, including over 50 hired from other federal agencies. Midlevel or upper level hires generally require less training than entry-level hires from universities to perform their jobs.

More broadly, although the agency exceeded its hiring goals in fiscal year 2006, it is unclear whether NRC can effectively close critical skills gaps in the near and longer term. While the agency determined that it closed about 55 gaps in fiscal year 2006, it also identified 115 new gaps and 76 continuing or long-term gaps.²⁴ Most new NRC employees typically need from 1 to several years of targeted technical training, on-the-job experience, and/or development opportunities to fully learn and perform agency job functions, according to NRC managers. In addition, making determinations about whether gaps are sufficiently filled is an involved process and often depends on managers' understanding of each employee's knowledge and skills. However, maintaining that understanding will likely become more difficult as workforce demographics shift and NRC reorganizes and grows. In addition, gaps are determined at the branch level, reported at the office and regional levels, and compiled into an agencywide assessment. While some knowledge and skills are easily shared within branches, divisions, or offices, managers told us that the transferability of employees across these areas can be limited.

NRC also uses various flexibilities in recruiting and hiring new employees, and it tracks the frequency and cost associated with the use of some flexibilities. (See app. V for NRC's use of human capital flexibilities, authorities, tools, and programs.) For example, we found that OHR, program, and regional managers identified recruitment incentives as among the most valuable of NRC's tools. Comparisons of recruitment

²⁴NRC defines "new gaps" as those of the current fiscal year; "continuing gaps" as those of the last 2 fiscal years; "long-term gaps" as those of 3 or more fiscal years; and "closed gaps" as those for which the need has been filled.

incentive awards in fiscal years 2004 and 2006 show that (1) the number of awards increased from 6 to over 140, (2) total monetary awards increased from \$77,000 to \$979,000, and (3) the maximum value of an award increased from about \$5,400 to over \$20,000. NRC requested \$1.25 million to make about 160 incentive awards in fiscal year 2007. In addition, NRC awards standardized recruitment incentives to many entry-level engineers and scientists and, on a case-by-case basis, to midlevel personnel who are typically in more specific critical skills areas. NRC tracks midlevel hires who received recruitment incentives—about 60 in fiscal year 2006—and at least 90 percent worked in the private sector, including many for nuclear power plants or reactor vendors.

NRC managers we interviewed and surveyed were generally satisfied with recruitment incentive awards and other available recruiting and hiring flexibilities, but they also said that direct hire authority would be a particularly useful recruiting and hiring tool.²⁵ In March 2006, OPM did not approve NRC's request to obtain this authority because it determined that the law does not apply to NRC's excepted-service positions. OHR managers told us that direct hire authority is among NRC's most wanted legislative authorities and that NRC is exploring avenues for obtaining it by, for example, requesting legislation.

Although NRC tracks the frequency and cost associated with some recruiting and hiring flexibilities, it does not fully use some of these data to inform management decisions and further target recruiting and hiring efforts. Similarly, NRC does not systematically evaluate the extent to which the flexibilities positively affect its ability to realize a diverse, highly skilled workforce. For example, NRC does not assess the effectiveness of alternative recruitment incentives in attracting highly skilled employees or early replacement hiring that enables a new employee to work with a long-term employee who plans to transfer locations or retire. Without evaluating the effectiveness of its flexibilities, NRC may either under- or over-use certain authorities and flexibilities and inefficiently use its annual human capital funding. The Human Capital Council could provide a forum for evaluating the office- and agency-level implementation of human capital flexibilities and their effectiveness.

²⁵Direct hire authority enables an agency to hire any qualified applicant, after public notice is given, without regard to competitive rating and ranking, veterans' preference, and "rule of three" procedures. OPM can give direct hire authority to federal agencies when a critical hiring need or severe shortage of candidates exists. See 5 U.S.C. § 3304(a)(3).

NRC Has Many Training and Development Programs in Place and Is Using Flexibilities to Enhance Existing Capacity

Opportunities may also exist to improve some of NRC's recruiting processes. For example, it is unclear to what extent NRC managers systematically prioritize the positions that need to be filled, including the extent to which incentives should be offered to prospective employees. Similarly, a cognizant NRC manager told us that the agency appeared to dedicate a disproportionate amount of resources to recruiting and hiring at the entry level, for which the pool of applicants is very robust, as opposed to midlevel and upper-level positions, for which candidates generally have had work experience in the nuclear power industry—mainly either at nuclear power plants or reactor vendors. In addition, most NRC managers expressed concern about NRC's future ability to recruit for midlevel and upper-level positions when faced with more aggressive industry competition.

NRC's training and development activities also represent a key gap closure strategy the agency uses. In general, the agency's training and development efforts include (1) agencywide, formal technical or leadership training and certification programs; (2) external training such as enrollment in specialized programs; and (3) on-the-job training involving knowledge and skills transfer on particular subjects. NRC recently finalized both a knowledge management program and a strategic training and development plan to support and sustain its critically skilled workforce. In fiscal year 2006, NRC allocated about \$9.7 million for leadership development, training and development, and knowledge management activities. Its fiscal year 2007 budget request proposed to increase training and development spending to about \$15.4 million, including \$4.2 million for new reactor training, \$4 million for internal technical training, and over \$3 million for office-specific training.

Managers we interviewed and surveyed identified NRC's formal training and development—such as qualification programs for materials or reactor health physics inspectors—and its Nuclear Safety Professional Development Program, SES Candidate Development Program, and Leadership Potential Program as among the most valuable for training and developing personnel. While NRC's Nuclear Safety Professional Development Program has been in place and has grown over the past several years, the agency also has expanded development opportunities for its midlevel and upper-level supervisors and managers, particularly in fiscal year 2006. Specifically, NRC facilitated increased, more frequent enrollments in both the Leadership Potential Program and its counterpart Team Leader Development Program. Because the increase in the overall size of NRC's workforce corresponds with the need for trained supervisors, managers told us that providing sufficient training and

development opportunities for new supervisors is vital. These managers expressed concern about any potential negative effect of excessive workloads on frontline supervisors, many of whom are also new to their positions.

In addition to increasing participation in its development programs, NRC is increasing the frequency of key course offerings and focusing on particular critical skills areas. For example, in early 2006, OHR and NRR evaluated the extent to which training on new reactor designs would be required—anticipating future gaps on unique elements related to the regulatory process and design technologies—for which the agency has initiated specific training courses. Similarly, NRC plans to extend its Graduate Fellowship Program, which helps attract a small number of high-quality, highly educated employees in critical skills areas that the agency might not otherwise successfully hire.

In July 2006, NRC instituted a knowledge management program to facilitate the transfer of knowledge and skills on specific subjects. The program is intended to systematize NRC's existing structure to better support the faster rate of collection, transfer, and use of a broader scope of knowledge needed to support, for example, new reactor technologies and new reactor designs. The program outlines initiatives that serve to avoid significant loss of mission-critical knowledge. NRC plans to (1) take over 15 implementing actions to facilitate the transfer of knowledge and skills during fiscal years 2006 through 2008 and (2) allocate over \$1 million and several personnel to implement the program.²⁶ In general, the managers we interviewed and surveyed said the program would be an increasingly valuable tool in the coming years. NRC also uses the following specific flexibilities to transfer skills and knowledge:

- NRC has hired replacements for certain positions before the current occupants leave the agency. Known as early replacement hiring or double encumbering, this flexibility allows NRC to provide salary and benefits funding for up to 1 year for the purpose of transferring critical skills, competencies, and institutional memory from an employee who is planning to leave NRC to a replacement employee. To be effective, early replacement hiring requires that the departing employee inform NRC of such intentions well in advance of the actual departure date. Since 2004, NRC's annual funding for early replacement hiring has remained at

²⁶Some of the fiscal years 2007 and 2008 funding and new projects have not been approved.

\$630,000, and an agency manager estimated that NRC had spent about \$565,000 for 12 positions in fiscal year 2006.

- As authorized by the Energy Policy Act of 2005, NRC has waived dual compensation limitations, known as the pension offset, for rehired retirees receiving pensions. This flexibility, known as the elimination of pension offset, allows NRC to rehire a retiree to fill a position at full pay if NRC has had difficulty in filling the position or if a temporary emergency exists.²⁷ In fiscal year 2006, NRC granted waivers for 46 retirees in eight headquarters and regional offices and spent about \$2.3 million to employ them. The elimination of the pension offset is expected to become increasingly valuable to NRC in the next few years to retain access to expertise for knowledge transfer purposes.

Also in 2006, NRC completed its agencywide training and development strategic plan to support more systematization, definition, and integration of its overall training and development approach. The plan delineates four goals related to individual performance, training effectiveness, training efficiency, and organizational performance. It identifies the following actions that NRC plans to take to better anticipate staffing, skills, and expertise to improve planning and reduce reactive responses:

- ensure that its intended benefits are realized by using a documented and integrated approach;
- more comprehensively define competencies and training needs for major functions or groups of like positions; and
- better integrate its training and development programs with performance elements and standards, position descriptions, training needs surveys, and the SWP system.

NRC managers generally believe that documenting and enhancing training, development, and qualification programs will be essential to enable NRC personnel to accomplish NRC's mission effectively and efficiently over the next several years. Because determining gap closure frequently requires tracking particular skills gaps over a multiyear period, and is not always easily demonstrated, NRC could benefit from this more systematic approach.

²⁷NRC's Federal Employees Pay Comparability Act panel, composed of senior management officials, must approve the application of this and other flexibilities.

**NRC's Use of Tools,
Authorities, and Flexibilities to
Retain Critically Skilled
Employees Varies**

Nearly all of the managers we interviewed and surveyed said retention was not a problem, often citing NRC's 2005 attrition rate of about 6 percent. As a result, few managers identified retention tools as primary gap strategies that NRC most frequently uses to meet existing and future skills needs. However, the managers expressed general concern about impending retirements and potential future resignations if competition with the nuclear power industry intensifies for critically skilled employees.

NRC employs some of the same tools, programs, and flexibilities to retain personnel that it uses to hire employees, but their purpose, audience, and application vary. For example:

- NRC managers cited the relocation incentive as a valuable tool in retaining NRC personnel, especially inspectors, who move to new positions. Overall, 39 employees at the midlevel and upper level received a cumulative amount of \$638,000 in fiscal year 2006. When change-of-station benefits and relocation services are added to this amount, relocation outlays totaled approximately \$15 million and represented the majority of NRC's 2006 human capital budget's Talent subcategory.
- NRC offers retention incentives, although somewhat infrequently. In fiscal year 2006, it awarded four, totaling less than \$35,000.
- NRC spent less than \$1 million in total for student loan repayments for fiscal years 2004 through 2006. Its use of student loan repayments as a retention incentive has been relatively steady in recent years and has primarily targeted a handful of employees hired into the Honor Law Graduate Program. However, some NRC managers believe its use might be expanded in the next few years.
- Most managers we interviewed and surveyed considered telework and flexible work schedule arrangements to be very to extremely valuable, and would be of the same or increasing value in recruiting, hiring, and retaining NRC personnel in the next few years. However, a cognizant NRC manager said that managerial and supervisory responsiveness to such arrangements varies. NRC does not routinely track or evaluate telework participation, such as the number and type of requests approved and denied, costs, benefits, and resource requirements associated with the program. However, NRC informally surveys offices about the number of employees who telework regularly, which is typically considered to be 1 day per workweek. As of November 2005, when NRC last gathered this information, about 250 of NRC's 3,000 employees regularly teleworked. In addition, many NRC employees telework on an irregular and infrequent basis.

Although NRC uses and tracks these retention flexibilities to varying extents, it has not collected the information on each flexibility's costs and benefits needed to assess its effectiveness in retaining critically skilled employees while fulfilling management's objectives.

Some Enhancements of NRC's Infrastructure to Support Administrative, Educational, and Other Requirements Are in Process

Agencies should build the capability needed to address administrative, educational, and other requirements—including information technology, security, and adequate space—that are essential to supporting infrastructure needs. Our prior work has found that agency officials should look for instances to improve process and procedure efficiencies and economies to reallocate resources and enable their human capital organizations to meet expanded roles in times of growth or change. We determined that NRC has taken steps to develop its internal capability to support the large number of new employees it expects to hire in upcoming years because of retirements and anticipated applications for licensing new nuclear reactors. In recent years, NRC has enhanced its administrative and information technology and communications support processes to improve its infrastructure. However, the agency still faces a few key limiting factors that, if left unaddressed or unresolved, may adversely affect its ability to meet current and future workforce needs.

To improve its human capital administrative processes related to management, NRC has streamlined its recruiting and hiring processes by, for example, introducing an automated hiring system, identifying areas where it could standardize and streamline its processes, and eliminating unnecessary duplication of efforts. Implemented in 2002, NRCareers is an automated hiring system that hosts on-line vacancy announcements and an online application process. While this system has the ability to support an automated rating process and interface with such Web sites as USAJOBS, the development of these capacities is still in process. In addition, NRC has been (1) working with its personnel security branch to streamline the security clearance process for new hires and (2) granting clearances under reciprocity required by pertinent executive orders.

NRC also has been creating support systems to improve its management of human capital data and reduce inefficiencies. For example, in July 2005, NRC created the Recruitment Activity Tracking System, a centralized Web-based system to monitor candidates' status, including when offers are received and for what position, start dates, and reasons candidates gave for declining offers. OHR and program office managers use this system to monitor vacancy announcements agencywide. Because the system records acceptance status, it can enhance coordination when NRC offices extend

more than one offer to selected candidates; although calculating actual offers and acceptances is slightly more complex. NRC also uses the Recruitment Activity Tracking System to facilitate planning for space, security, resource allocation, and information technology by tracking employees' arrival dates. NRC plans to expand the system's capacity to track the security clearance process and notify OHR managers if candidates exceed a 30-day review period. NRC also has taken steps on e-Government initiatives to provide consolidated information on employment actions and history, integrating payroll and personnel action processing, and human resources line-of-business alignment.²⁸

To improve its educational infrastructure and internal communication process, NRC has developed and is in the process of implementing the following three information management systems during fiscal year 2007:

- NRC is developing an automated system to support its Lessons Learned Program—a set of processes, procedures, and oversight designed to collectively ensure that significant agency deficiencies are identified and corrected so they do not recur. This tool will link two existing agency systems to provide a Web-based, searchable and retrievable record of how each recommendation is addressed and will support program efforts to institutionalize the knowledge gained through the corrective action processes and develop solutions for long-term organizational retention.
- NRC is improving the quality and capabilities of its Agencywide Document and Access Management System in terms of availability, performance, functionality, ease of use, and timeliness. Specifically, as a tool to capture knowledge, the Agencywide Document and Access Management System could help coordinate the timely review of license applications by serving as a complete and easily accessible repository of documentation for licensee information, according to NRR managers.
- By mid-2007, NRC plans to launch the Learning Management System, which will replace the current training administration system. The Web-based system is designed to facilitate employees' and managers' abilities to view training options, plan coursework, and track and record progress in qualification programs. The system's original launch date, September 2005, was delayed because of compatibility problems related to the application

²⁸The goals of the human resources line-of-business alignment include improved management, operational efficiencies, cost savings or avoidance, and improved customer service.

and certification and accreditation requirements. NRC subsequently postponed its launch to implement an updated version of the application that had been developed. OHR managers want to link the Learning Management System to the SWP system because their efforts to efficiently use training resources have been complicated by incompatible information technology systems.

While these initiatives are under way, NRC faces challenges in building the information technology and security infrastructure necessary for its increasing workforce. For the past 5 years, NRC's IG has cited the protection of information and the implementation of information resources as serious management challenges. NRC's Office of Information Services—which is responsible for information management, architecture, and policies—has taken steps to improve the infrastructure by acquiring new systems and integrating existing systems. The Office of Information Services also has (1) interfaced with NRR and other offices to determine the amount and type of services needed for new reactor licensing, (2) recruited and hired additional personnel to support the implementation of these new systems, and (3) begun to investigate contracting options to complement these new hires. However, it is unclear whether these steps will adequately meet the challenges associated with NRC's changing demographics and growing workforce. For example, NRC managers we interviewed and surveyed said telework would be one of the most valuable flexibilities available to NRC personnel in future years. However, NRC's information technology infrastructure can support only a limited amount of telework and would need to be upgraded to provide teleworking employees with secure and reliable access to e-mail and agency applications.

Providing sufficient physical space in which its growing workforce can interact is one of NRC's greatest human capital challenges, according to its top leadership. In April 2006, NRC requested congressional assistance in persuading the General Services Administration and the Office of Management and Budget to address its space needs because NRC had exhausted the space available in its headquarters building in Rockville, Maryland, despite its space optimization program. Among the negative effects of inadequate physical space cited by NRC's top leadership are the inability to (1) appropriately colocate its new personnel with their organizational units to integrate them into the organization and provide supervision and (2) provide sufficient training and meeting space in headquarters for knowledge transfer and training and development purposes. OHR managers told us that training classes, in recently acquired space, began in mid-October 2006 after a 6-month delay. However, it is

unclear when NRC will be able resolve its long-term space needs because the Office of Management and Budget had not authorized the General Services Administration to send its proposal for more space to Congress for approval. NRC's top leadership is concerned that insufficient space will lead to overcrowding that will adversely affect NRC's ability to attract new workers and could lead current workers to leave NRC for organizations with a better working environment.

Although NRC Uses Several Human Capital Measures, Some Do Not Provide Sufficiently Meaningful Information to Evaluate Progress

Our prior human capital work found that agencies need to develop appropriate performance measures to link human capital measures with strategic goals so they can be used to gauge success and evaluate the contribution of human capital activities toward achieving programmatic goals. We also found that developing meaningful outcome-oriented performance measures for both human capital and programmatic goals, and the collection of performance data to measure achievement of these goals, are major challenges for many agencies.

NRC's annual performance planning process, through which its performance budget is developed, provides performance measures for each goal in its strategic plan.²⁹ Through the performance budget process, NRC develops key planning assumptions, program drivers, and outputs and establishes output- and outcome-based measures to monitor and evaluate program execution. NRC maintains two overall performance outcome measures to determine progress toward achieving excellence in agency management. To monitor human capital performance, NRC assesses progress using six output measures and targets for the recruiting and staffing and the training and development categories.

In assessing NRC's human capital measurement framework, we found the following:

- NRC has collected, tracked, and reported important demographics and human capital data and monitored workforce size, shape, and other characteristics for at least the past 5 years. OHR maintains a series of agencywide strategic workforce planning demographics tables that track employees by office and, for example, by their (1) race, ethnicity, and gender characteristics; (2) occupations and degree levels; (3) years of NRC

²⁹Measuring and monitoring performance is one of four components of NRC's Planning, Budgeting, and Performance Management process.

and federal service; (4) grade or pay level; and (5) retirement eligibility and attrition projections and rates. NRC uses these data to monitor progress in achieving such human capital targets as the number of professional entry-level hires as a percentage of total hires.

- OHR uses around 30 intended outputs, targets, and measures to monitor progress in recruitment and staffing, training and development/knowledge management, strategic workforce planning, leadership development and succession planning, employee and labor relations, and diversity management. OHR categorizes intended outputs in terms of effectiveness, timeliness, quality, efficiency, and customer satisfaction and compiles the agencywide results on these metrics. Program offices also are expected to monitor certain administrative metrics, such as the percentage of professional hires at higher grade levels, and to report their status to the Executive Director for Operations.
- In fiscal year 2006, NRC met or exceeded most of its human capital targets associated with its measures and intended outputs. For example, NRC exceeded its target for overall hires of 300 new employees—subsequently increased to 350 new hires—by bringing on 371 employees in fiscal year 2006. In addition to these new hires who started by September 30, 2006, approximately 145 employees were hired as a result of fiscal year 2006 efforts but reported for duty during the first quarter of fiscal year 2007. Of these 145 employees, at least 95 are in occupational series that are typically considered mission-critical.
- NRC plans to develop, or is in the process of developing, several additional measures, outputs, or metrics to gauge its overall progress toward achieving human capital outcomes. These efforts include the following:
 - NRC is developing additional output measures for workforce diversity and work life services to include in its performance budget during fiscal year 2007. NRC also plans to develop measures to annually assess program results in knowledge management.
 - NRC continues to explore ways to improve its existing training and development performance measures and metrics. For example, NRC is refining its training output measures related to tracking the average number of training hours completed per person and the percentage of personnel who completed a minimum number of training hours. These data will provide a baseline to determine appropriate future targets and ensure consistency across offices, as appropriate, according to OHR managers. These two output measures are among others being or already developed to enhance how NRC monitors the extent to which it

is addressing identified training needs, which is one of its broader performance plan measures.

- NRC plans to refine preliminary employee and labor relations measures to improve both the monitoring and evaluation of employee and labor relations actions, services provided, or overall performance. In particular, a cognizant agency manager told us that measuring the timeliness of processing grievances and disciplinary actions, as well as services provided, would enhance performance measurement.

Although NRC met many of its human capital-related targets for fiscal year 2006, the agency has not fully implemented an agreed-upon framework by, for example, integrating its measures through a human capital accountability system plan. According to its 2004 strategic human capital plan, NRC intended to develop such a plan to identify the measures and associated targets that NRC would use to assess its achievement of human capital outcomes. Program office and OHR managers we interviewed and surveyed cited the need for an agreed-upon framework to improve the effectiveness and appropriateness of specific measures and targets. In further commenting on NRC's measurement framework, some managers cited the importance of sufficient linkage between the successful use of human capital strategies and meeting safety, security, openness, and effectiveness goals. The managers believe reliability and validity improvements would help NRC evaluate progress as its workforce expands and changes. Specifically, they expressed concern that while existing agency measures, intended outputs, and targets may be used to monitor progress, they do not enable managers to fully evaluate associated progress or performance. Without effective measures and appropriate targets, it may be more difficult for NRC to gauge workforce trends and use them to inform decision making.

In addition, the managers we interviewed and surveyed had varying opinions about specific measures or targets. For example:

- While NRC exceeded a 75-percent target to retain personnel for a minimum of 3 years—reaching over 90 percent—some managers suggested that the target should be further examined to determine whether the 3-year target correlates with a long-term or career commitment because the new generation of workers appears to be less inclined than the previous generation to make a longer-term commitment to NRC.

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- NRC also exceeded a target of hiring at least 25 percent of staff at the entry level—reaching 34 percent, a target originally put in place to reduce the NRC employee’s average age, according to officials. However, some suggested that NRC consider whether the target is an appropriate agencywide measure, or would be better set at the program office level, given offices’ varied workforce needs.
 - NRC’s overall attrition rate of 6.3 percent for fiscal year 2006 was higher than its expected 6 percent; the agency lost about 205 staff, predominantly to retirement. NRC’s projected attrition rates are 6.25 percent for fiscal year 2008 and 6.5 percent for fiscal year 2009. Because NRC slightly underestimated its attrition for fiscal year 2006 and the attrition rate projection for fiscal year 2008 is lower than the actual fiscal year 2006 rate, maintaining these projections may underestimate the rate at which attrition may rise as nuclear industry competition for skilled employees increases and as older staff members retire. As a result, some managers believe that projections should incorporate a higher estimated attrition rate.
 - Some managers noted both the usefulness of having, and the difficulty in attaining, the OPM target of issuing offer letters within 45 days after a vacancy announcement closes. NRC reported it met this target 67 percent of the time; however, while over 190 offer letters took at most 45 days, about 65 offer letters took at least 100 days to issue. Additionally, one manager stated that the 45-day time frame is too long for the competitive environment in which NRC is hiring.

NRC Is Taking Steps to Address Future Uncertainties That Could Adversely Affect Its Overall Workforce Capacity

NRC is addressing two key uncertainties affecting its emerging workforce needs—how to (1) maintain its workforce in the face of future competition with the nuclear power industry for critically skilled workers and (2) accurately gauge its workload during the next 3 years—particularly for reviewing COL applications to construct and conditionally operate new reactors. Regarding a likely increase in competition with the nuclear industry for critically skilled workers, NRC is monitoring the numbers and salaries of scientists and engineers in a few key disciplines and working more closely with key university programs with the goal of strengthening its candidate pipeline. Regarding COL applications, although electric power companies have sent letters of intent to NRC, stating that they plan to apply for 20 licenses to build and operate at least 29 new nuclear power reactors in fiscal years 2008 and 2009, it is unclear how many of these projects will proceed in the near future. Specifically, NRC expects to receive 8 applications by December 2007, 10 additional applications by the end of September 2008, and 2 more by the end of September 2009; for each

COL application, almost half of the resources required would be used in its first year. To reduce uncertainties and encourage efficiencies related to its license review process, NRC has developed a design-centered approach to standardize its review of COL applications for new reactors. However, changes in the number and timing of application submissions will affect NRC's staffing and resource requirements.

NRC Has Taken Steps to Address Broader Challenges It Faces in Sustaining Expertise

NRC and the nuclear power industry have raised concerns in recent years about a shrinking labor pool of critically skilled individuals in several workforce areas required for the research, design, construction, operations, and oversight of nuclear reactor and plant operations. The nuclear power industry estimated in 2001 that about 90,000 workers will be needed to support existing industry operations through 2011.³⁰ In addition, thousands of employees will be needed for the design, licensing, construction, and start-up operations of the proposed new reactors. Specifically, the nuclear industry faces a potentially critical shortage of workers in several fields over the next 5 years.³¹

To keep apprised of industrywide trends and inform its workforce assumptions, NRC has contracted with DOE's Oak Ridge Institute for Science and Education for over 20 years to gather and evaluate occupational, salary, and university enrollment data particularly for nuclear engineering and health physics—two mission-critical occupations. For example, although university bachelor's and master's enrollments and degrees granted in these disciplines have increased since 2004, fewer than 700 degrees are granted annually from about 60 academic programs nationwide,³² which is less than during the early to mid-1990s. For nuclear engineering, the institute also has reported:

- Overall national trends have improved in terms of enrollment and degrees granted. For example, in 2005 total junior, senior, and graduate student

³⁰NEI is working to estimate the number and general types of workers needed to bring this new generation of reactors and plants to fruition.

³¹NEI, *Nuclear Energy Industry Initiatives Target Looming Shortage of Skilled Workers*, (Feb. 2006).

³²Oak Ridge Institute for Science and Education, *Manpower Assessment Briefs #58 and #59: Nuclear Engineering and Health Physics Enrollments and Degrees Surveys, 2005 Data* (Oak Ridge, TN: 2005); *Labor Market Trends for Nuclear Engineers through 2010* (Oak Ridge, TN: 2006); and *Labor Market Outlook for Health Physicists: Updated through 2008* (Oak Ridge, TN: 2005).

enrollments surpassed the 2,000 level for the first time since the mid-1990s. However, only about 60 percent of new graduates directly enter the U.S. civilian labor force, while the other 40 percent continue their academic studies, enter active-duty military, or take jobs in foreign countries. Furthermore, NRC typically requires that applicants be U.S. citizens,³³ which further reduces the number of graduating candidates eligible for employment, especially at advanced degree levels. While a large majority of B.S. degree recipients were U.S. citizens, non-U.S. citizens comprised 20 percent of master's recipients and 47 percent of Ph.D. recipients in 2005.

- Because the demand for nuclear engineers is expected to grow faster than the supply, upward pressure on starting salaries—which increased by only 2 percent in 2004-2005 but by over 5 percent in 2005-2006—will continue and provide even more competition to employers in the nuclear engineering field.

For health physicists, the institute has reported:

- Overall trends have improved in terms of enrollments and degrees granted. For example, undergraduate and graduate enrollments were 15 percent higher than in 2004, and continuing increases are expected. The number of health physics-related B.S. degrees granted in 2005 increased by over 40 percent from 2004, and at 78 is the highest reported since 1996; degrees in master's programs increased by 20 percent to 77 granted, while Ph.D.s granted remained constant. Similar to nuclear physics, while a large majority of B.S. degree recipients were U.S. citizens, 30 percent of master's and 36 percent of Ph.D. degree recipients were non-U.S. citizens.
- The number of job openings for new graduates will likely continue to exceed the number of new graduates available in the labor supply from 2006 to 2008 and even with increases in enrollments will likely be insufficient to substantially reduce projected relative shortages of new graduates between 2006 and 2008. The institute noted that more health physicists will be retiring over the next few years and many, if not most, will have to be replaced, as reflected in a higher number of projected job openings. NEI also reported that the general availability of health physicists is expected to decline over the next 5 years.

³³NRC has authority to hire non-citizens. See 42 U.S.C. § 5852. However, according to NRC managers, the agency's policy is to generally require U.S. citizenship, citing the cost and time of obtaining a security clearance as a primary concern. NRC would make an exception to this policy for highly sought after critical skills.

Because the workforce will likely tighten in several areas before current graduation levels produce anywhere near the number of trained and educated personnel to meet the likely demand over the next decade, NRC has taken the following steps to increase its talent pool:

- Has planned to spend nearly \$5 million in fiscal year 2007 to implement its authority under the Energy Policy Act of 2005 to award, in grants to universities and colleges, support for educational programs that will benefit its safety, security, and environmental responsibilities. During fiscal year 2006, training and development program managers worked to develop criteria for identifying educational programs for which investments will most likely expand expertise in critical skills areas. Implementation of this grants-to-universities program is targeted for fiscal year 2007.
- Budgeted \$225,000 in fiscal year 2006 and proposed \$375,000 in fiscal year 2007 to offer scholarships and fellowships in critical skills areas.
- Budgeted \$125,000 in fiscal year 2006 and proposed \$140,000 in fiscal year 2007 for student transportation and lodging expenses while on temporary assignment to NRC, which managers told us was particularly useful in attracting candidates.
- Integrated and enhanced existing programs to create a program for Minority Serving Institutions—historically black colleges and universities, Hispanic serving institutions, and tribal colleges and universities—that provides financial assistance to programs and such activities as mentoring, training, research and development, cooperative agreements, fellowships, internships, and scholarships. In August 2006, NRC announced plans to link this program with its recruiting program and develop relationships with recipients of its financial assistance to (1) encourage the development of skills and research critical to the agency, (2) provide access to educational and career development opportunities, and (3) increase the diversity of the job applicant pool.

While NRC has taken these steps, and the nuclear power industry is similarly making or continuing efforts to partner with educational institutions to develop workers or augment their existing training programs, enhancing the talent pool may require additional approaches. Besides health physics and nuclear engineering, many of the over 300 vacancies—for which NRC posted over 60 position descriptions in several occupational series in fiscal year 2006—require specialized knowledge, skills, and experience that will likely continue to be hard to fill or in high demand. These include, but are not limited to, areas such as project

management, reliability and risk analysis, and digital instrumentation and control. Quicker and more focused training options include intensifying the amount of course detail and/or increasing certification or specialization requirements, and further developing and executing strategies that capture and transfer the significant knowledge of aging workers.

NRC Has Taken Several Steps to Prepare for New Reactor Licensing, but the Combined License Review Process Is Untested

A number of activities that NRC has undertaken to prepare to review COL license applications to construct and conditionally operate new reactors are in various stages of completion. These NRC activities include (1) initiating its Construction Inspection Program; (2) moving forward on design certifications and early site permit activities; (3) continuing and finalizing the development of regulatory guidance, rulemaking, and standard review plan materials addressing the contents of a COL application. NRC also has developed initial estimates of the resources needed to review new reactor license applications. As of August 2006, when the Commission approved the creation of the Office of New Reactors, fewer than 100 employees were working either part- or full-time on new reactor licensing and preparatory activities. NRC is in the process of staffing the Office of New Reactors with the targeted number of employees scheduled to more than double from 230 in late January 2007 to over 480 in October 2007.³¹ (See app. IV for information on NRC's recent reorganization efforts.) In addition, NRC has estimated the following regarding new reactor licensing work:

- NRC employees will perform about two-thirds and contractors will perform about one-third of the COL review work. In August 2006, NRC reported that about \$60 million for contracted expertise would be required in fiscal year 2008 to acquire the expertise of individuals who have (1) very specialized skills that NRC personnel do not possess and that is not cost-effective to add full time or (2) general engineering expertise that NRC personnel possess in insufficient numbers.
- Given that nearly all applications are expected to be submitted in fiscal year 2008, licensing resource needs for new reactors would remain the same or increase slightly in fiscal year 2009, depending on whether NRC receives more applications, and on their timing and number. Industry has

³¹For purposes of this report, the number of employees is equated to FTE positions on a one-to-one basis. NRC provided estimates both in terms of the number of employees and FTE positions.

advised NRC of the possibility that higher than the planned number of applications—20 as of November 2006—may eventually be submitted.

To integrate planned and ongoing activities, NRC is also developing a master schedule/project management plan that is to match activities to personnel with appropriate skills to scheduled completion dates; NRC estimated the plan's completion date is early 2007. In addition, in the event that the agency's recruiting goals are not met, NRC is developing a procurement contingency plan. This plan would enable NRC to acquire technical review support from a broad spectrum of organizations. NRC anticipates that the upcoming increase in contracting demand for a diverse range of skill sets needs may exceed the capabilities or supply of any given source. Also, NRC reported that DOE's Office of Science laboratories are establishing a team to assist NRC in identifying needed technical resources and management skills.

NRC also has focused its new reactor licensing efforts on delineating its standardized design-centered review approach. NRC expects this approach will improve the efficiency of its review of COL applications by reducing the review time to at most 42 months, including holding required public hearings. NRC could not fully base its estimates on recent experience or historical data because its review process has yet to be tested. However, NRC did evaluate the resource requirements for the first three early site permit applications it received in 2003 to inform its COL application estimates.³⁵ NRC's review of each early site permit took more time and effort than either NRC or the applicants expected. NRC managers told us that the agency learned from this initial experience and expects future early site permit reviews to go more smoothly. They expect a similar learning curve with the first group of COL reviews, noting that estimates of the personnel needed to review COL applications may thus be subject to some adjustment. In addition, because this first group could be large—10 applications are expected in the first 6 months of fiscal year 2008, and 8 are expected in the second 6 months—any challenges, if not fully resolved, could be exacerbated.

The COL application process is new for the electric power companies as well. NRC's staffing and resource estimates are based on standardization

³⁵An early site permit resolves site safety, environmental protection, and emergency preparedness issues independent of a specific nuclear plant design. The early site permit application must address the safety and environmental characteristics of the site and evaluate potential physical impediments to developing an acceptable emergency plan.

and consistency and complete, high-quality applications. To this end, NRC has established reactor design-based working groups with industry to facilitate communication and interaction about all aspects of the application process, including lessons learned on most recent construction activities as well as financing, hardware, supply, and other infrastructure issues. Nevertheless, the agency will not know how effective these activities have been until applications are submitted—NRC expects the first COL applications to be submitted in October 2007. In addition, determining the sufficiency of additional information NRC requests from a licensee may require both significant analytical expertise and review by the agency, and timeliness on the part of the applicant. Furthermore, any delays in the completion of technical review plans or lack of clarity in regulatory guidance could make it more difficult for companies to ensure the adequacy of their submissions.³⁶

The timing of COL application submissions could also adversely influence the intended effectiveness of NRC's design-centered review approach. Although NRC documents state that the optimal implementation of the approach is to first have a completed design certification, many activities will likely occur simultaneously or near-simultaneously. Standardization is key to NRC's approach, as applicants are expected to submit standard applications that use reactor designs that have been certified. This suggests that NRC would certify a reactor design before it reviews COL applications that refer to that design. That is not the case, however, for 8 of the 20 COL applications NRC expects to receive because (1) applicants plan to submit 3 COL applications about halfway through NRC's certification of the associated design and (2) NRC expects to review 5

³⁶In its October 6, 2006, report entitled *Inspector General's Assessment of the Most Serious Management and Performance Challenges Facing the Nuclear Regulatory Commission*, (OIG-07-A-01), the IG identified the ability to meet the demand for licensing new reactors as one of nine challenges. Elements of this challenge include having staff with project management skills; reinstating its construction inspection program; maintaining a defined technical review process; ensuring that its Standard Review Plan for examining license applications is comprehensive and consistently implemented; and instituting a process to compile its regulatory examination into a Safety Evaluation Report that assesses a plant's ability to operate safely.

other COL applications nearly simultaneously with its certification of the design.³⁷

Similarly, an important component of NRC's approach is the use of a "reference application." According to NRC managers and NEI executives, around 70 percent of additional application contents are intended to be virtually identical to the reference application. NRC assumes it will realize FTE/resource savings of 50 percent on the safety reviews of applications consistent with the reference application. However, it is unclear whether the use of reference applications will actually save NRC review time when they are reviewed concurrently with others. In essence, NRC will conduct multiple, nearly simultaneous application reviews for all designs that companies currently intend to use. For example, NRC expects the reference application and three applications for the same design to arrive in the same fiscal quarter. Ultimately, because of these compressed time frames, the efficient and effective allocation of resources and adherence to schedules is paramount.

Conclusions

In recent years, NRC's human capital management has been generally effective in comparison with its federal government counterparts. Nevertheless, NRC faces a considerable challenge in addressing workforce retirements and anticipated significant additional work beginning in October 2007, as electric power companies submit applications for licenses to construct and operate the next generation of nuclear power reactors. Through its strategic human capital planning and management framework, NRC has taken several important steps to enhance its overall workforce capacity; however, some new and in-progress efforts have not yet been tested. It is unclear how the confluence of increasing regulatory workload demands, maintaining existing focus on safety and security activities, rising numbers of retirement-eligible employees and other demographic shifts, and anticipated industry competition for critically skilled workers will ultimately influence NRC's generally positive workforce trends and successes. These challenges require a considerable level of flexibility, staff commitment, and successful strategic human capital management for NRC to be able to appropriately adapt to shifting

³⁷ Applicants generally plan to use the (1) Westinghouse Company's AP 1000 reactor, which NRC has certified; (2) General Electric, Toshiba, and Hitachi's Advanced Boiling Water Reactor, which NRC has certified; (3) General Electric's Economic Simplified, Boiling Water Reactor, which NRC is currently reviewing; or (4) AREVA NP's Evolutionary Pressurized Water Reactor, which NRC plans to begin reviewing in fiscal year 2008.

human capital needs. If overall workforce and resource allocations are not balanced, NRC risks overextending its available workforce, undermining its employee satisfaction, and potentially increasing its attrition. If so, reviewing license applications and conducting other mission-critical activities within estimated time frames could become more difficult and could adversely affect NRC's ability to ensure a safe and secure nuclear power industry. Furthermore, substantial delays in the license application process could adversely affect investor confidence, decrease the likelihood of nuclear energy generation being cost beneficial, and possibly reduce the amount of electricity available to the U.S. market.

Recommendations for Executive Action

To improve NRC's ability to meet its current and future needs for a critically skilled workforce, we are recommending that NRC take the following four actions:

- Promote the coordination and integration of human capital planning and implementation activities by completing the agencywide human capital implementation plan; ensuring that the Human Capital Council provides strategic direction, advice, and recommendations on addressing human capital issues; and providing the appropriate level of resources to implement knowledge management program and strategic training and development plan.
- Systematically assess the effectiveness of NRC's use of tools, authorities, and flexibilities for recruiting, developing, and retaining its workforce and adjust their use and targeting, as necessary, to meet workforce needs.
- Periodically and comprehensively evaluate and share information among NRC's offices on the usefulness of human capital measures, intended outputs, and targets to enhance NRC's ability to monitor trends, reliably measure progress, and inform program office managers in achieving critical human capital tasks.
- Survey employees during fiscal year 2007 on their satisfaction with NRC's human capital program, including new initiatives and offices' use of flexibilities to maintain a quality work environment.

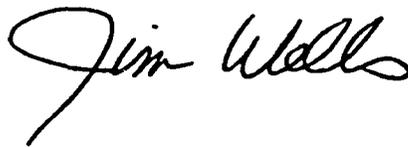
Agency Comments

We provided NRC with a draft of this report for its review and comment. In written comments, NRC generally agreed with the report's findings, conclusions, and recommendations, stating that they are very constructive. NRC also noted, however, that the circumstances underlying

the report have changed because Congressional leaders have announced their intent to extend the Continuing Appropriations Resolution, 2007, for the full fiscal year, with few exceptions. According to NRC, the funding in the Continuing Resolution—which extends the fiscal year 2006 appropriation amount to fiscal year 2007—would result in a \$95 million reduction in the level of funding that NRC had expected compared with the level approved by the full House of Representatives and the Senate Committee on Appropriations for fiscal year 2007. NRC states that the funding and FTE restrictions under a full-year Continuing Resolution at the fiscal year 2006 level would have a crippling effect on its ability to manage human capital, citing as an example that NRC would significantly curtail—and possibly cease—new hiring, except for those already given offers and those necessary for the most critical of skills. (See app. VI.) In addition, NRC provided comments to improve the report’s technical accuracy, which we have incorporated as appropriate.

We are sending copies of this report to interested congressional committees, the Chairman of NRC, the Director of the Office of Management and Budget, and other interested parties. We will also make copies available to others upon request. In addition, the report will be available at no charge on the GAO Web site at <http://www.gao.gov>.

If you or your staffs have questions about this report, please contact me at (202) 512-3841 or wellsj@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix VII.



Jim Wells
Director, Natural Resources
and Environment

Appendix I: NRC's Changing Workforce Demographics

The demographics of NRC's workforce will substantially change in the next few years for two reasons. First, the percentage of employees eligible to retire is expected to grow from the current level of about 16 percent to about 33 percent of the workforce in fiscal year 2010. Second, NRC projects that its workforce size will need to grow from about 3,100 employees in early fiscal year 2006 to nearly 4,000 employees by 2010 to meet the significant anticipated upsurge in workload demands as NRC begins to review power company applications for permits to construct and operate new nuclear reactors. The following tables present information on NRC's changing workforce demographics.

Table 2: Comparison of Selected NRC Workforce Demographics, Fiscal Years 2002 through 2006

Demographic	As of 9/30/2002	As of 10/2/2004	As of 9/30/2006
Total employees	2,928	3,110	3,347
Selected offices			
Office of Nuclear Reactor Regulation	591 (20%)	593 (19%)	739 (22%)
Office of Nuclear Security and Incident Response	105 (4)	187 (6)	216 (6)
Office of Administration	98 (3)	98 (3)	123 (4)
Office of Nuclear Materials Safety and Safeguards	332 (11)	334 (11)	334 (10)
Office of Nuclear Regulatory Research	208 (7)	217 (7)	225 (7)
Employees by age			
Average age	47.83	47.91	47.60
Under 40	576 (20%)	631 (20%)	745 (22%)
of which 29 and under	164 (6)	225 (7)	313 (9)
40 to 49	982 (34)	1002 (32)	1,016 (30)
50 to 60+	1370 (47)	1477 (47)	1,586 (47)
Employees by NRC service years			
Average years	13.65	13.16	12.29
0 to 5 years	747 (26%)	1,013 (33%)	1,311 (39%)
6 to 10 years	274 (9%)	265 (9%)	371 (11%)
11 to 20 years	1059 (36%)	983 (32%)	802 (24%)
21 or more years	848 (29%)	849 (27%)	863 (26%)
Employees by federal service years			
Average years	17.88	17.27	16.21
0 to 5 years	438 (15%)	655 (21%)	895 (27%)

Appendix I: NRC's Changing Workforce Demographics

Demographic	As of 9/30/2002	As of 10/2/2004	As of 9/30/2006
6 to 10 years	258 (9)	266 (9)	334 (10)
11 to 20 years	937 (32)	883 (28)	801 (24)
21 or more years	1,295 (44)	1,212 (39)	1,218 (36)
Employees: Science and engineering occupational series (percentage of agency total)			
Nuclear Engineering	14%	13%	12%
Other Engineering	29	31	34
Health Physics	7	6	6
Other Physical Science	5	6	6
Employees: Engineers, scientists, technical managers, and supervisors (percentage of office total)			
Office of Nuclear Reactor Regulation	80%	81%	82%
Office of Nuclear Security and Incident Response	54	55	48
Office of Nuclear Materials Safety and Safeguards	78	77	79
Office of Nuclear Regulatory Research	77	78	80
Region I	73	76	75
Region II	67	67	68
Region III	68	71	73
Region IV	69	72	73
Employees by pay level (percentage of agency total)			
Senior level	8%	8%	7%
GG-15	23	25	25
GG-14	25	25	24
GG-13	18	18	20
GG-12 to 8	16	17	16
GG-7 to 2	10	8	7
Entry-level hire ratio			
Agencywide	41%	25%	34%
Office of Nuclear Reactor Regulation	40	41	34
Office of Nuclear Security and Incident Response	18	12	13
Office of Nuclear Materials Safety and Safeguards	75	29	23
Office of Nuclear Regulatory Research	65	27	60
Region I	30	19	50
Region II	55	42	36

Appendix I: NRC's Changing Workforce Demographics

Demographic	As of 9/30/2002	As of 10/2/2004	As of 9/30/2006
Region III	33	13	38
Region IV	20	45	45

Source: NRC.

Note: Percentages may not add to 100 percent due to rounding.

Table 3: Percentage of the NRC Workforce that Is Eligible to Retire, Fiscal Years 2002 through 2011

Optional retirement eligibility	As of 9/30/2002	As of 10/2/2004	As of 9/30/2006
Fiscal year 2002	15%		
Fiscal year 2003	19		
Fiscal year 2004	23	16%	
Fiscal year 2005	27	20	
Fiscal year 2006	31	23	16%
Fiscal year 2007	36	28	21
Fiscal year 2008		32	24
Fiscal year 2009		37	29
Fiscal year 2010			33
Fiscal year 2011			37

Source: NRC.

Note: Actual percentages of NRC's workforce eligible to retire are shown for 2002 through 2006. Estimated percentages of NRC's workforce eligible to retire are shown for 2007 through 2011.

Table 4: Employees Who Left NRC, Fiscal Years 2002 through 2006

Permanent attrition	Number	Percent*
Fiscal year 2002	146	5.1
Fiscal year 2003	149	5.0
Fiscal year 2004	161	5.1
Fiscal year 2005	189	6.0
Fiscal year 2006	205	6.3

Source: NRC.

*Attrition percentages are annualized.

Appendix II: Scope and Methodology

To assess the extent to which the Nuclear Regulatory Commission (NRC) has aligned its human capital planning framework with its strategic mission and programmatic goals, we analyzed a broad range of NRC policy, planning, and implementation documents and reviewed key performance budget and performance and accountability documents and reports. Specifically, we examined information on NRC's operations and strategic planning efforts, including agencywide strategic plans and program documents, operating and human capital management plans, management directives, select internal analyses and communications of human resources personnel, Human Capital Council and Communications Council meeting minutes, and the NRC Inspector General's *Safety Culture and Climate Survey* results for 1998, 2002, and 2005.

We corroborated information provided in these documents in interviews with human resources managers in NRC's headquarters and regional offices. We also interviewed cognizant managers in NRC's Office of Human Resources (OHR); program offices including Nuclear Reactor Regulation (NRR), Nuclear Regulatory Research, Nuclear Materials Safety and Safeguards, and Nuclear Security and Incident Response; and NRC's four regional offices—region I in King of Prussia, Pennsylvania; region II in Atlanta, Georgia; region III in Lisle, Illinois; and region IV in Arlington, Texas. We visited regions I and II as well as NRC's Technical Training Center in Chattanooga, Tennessee.

To assess the extent to which NRC is effectively recruiting, developing, and retaining critically skilled personnel, we applied the five strategic workforce planning principles presented in our March 2002 exposure draft on a model for strategic human capital management and in our December 2003 report on key principles for effective strategic workforce planning. (See the Related GAO Reports section at the end of this report for a list of previous reports that we have issued on NRC and strategic workforce planning and human capital management.) We also reviewed the Office of Personnel Management's (OPM) *Human Capital Assessment and Accountability Framework* and related guidance. In doing so, we analyzed NRC's (1) workforce and demographics data; (2) critical skills information, including needs and gap assessments; (3) implementation of its recruiting, hiring, training and development, and retention strategies and plans; (4) implementation of new systems, programs, and processes that support human capital management and planning; and (5) measures of its progress and results. In addition, we analyzed NRC's reorganization plans, program plans, and human capital budget and flexibilities data. Furthermore, OHR and technical training center personnel provided

demonstrations on the Strategic Workforce Planning system database and Recruitment Activity Tracking System.

We also examined data obtained from the Federal Personnel Payroll System, NRC's Human Resource Management System, and NRC's Recruitment Activity Tracking System. In addition, we obtained budget and outlay data from NRC's Chief Financial Officer and OHR. To assess the reliability of the data needed to answer the engagement objectives, we checked these data for obvious errors in accuracy and completeness, reviewed existing information about these data and the system that produced them, and interviewed agency officials knowledgeable about these data. We determined that these data were sufficiently reliable for the purposes of this report.

To gain more insight into NRC's use of human capital flexibilities, authorities, tools, measures, and targets, we surveyed 45 Senior Executive Service and GG-15 level managers in 11 NRC offices, including OHR, technical program offices, and regional offices who represent strategic human management and leadership in offices with large components of critically skilled personnel. We obtained responses from 32 of 45 NRC managers, a response rate of 71 percent. The questionnaire asked respondents to rate the value of human capital flexibilities, authorities, tools, and programs that NRC uses in hiring, developing, and retaining personnel, and their value in the future. We also asked the managers to rate the effectiveness and appropriateness of measures and metrics in monitoring and evaluating progress in achieving programmatic goals at the agencywide and office levels.

The practical difficulties of conducting any survey may introduce certain types of errors, commonly referred to as "nonsampling errors." For example, differences in how a particular question is interpreted, the sources of information available to respondents, or the types of people who do not respond can introduce unwanted variability into survey results. To reduce nonsampling errors, we conducted four pretests with respondents to ensure that questions and response categories were interpreted in a consistent manner and revised the instruments on the basis of the pretest results.

To assess the extent to which NRC is taking steps to address future uncertainties that could adversely affect its overall workforce capacity, we examined (1) the existing and future engineering, science, and technology labor pool and (2) NRC's new reactor licensing activities. Regarding the labor pool, we reviewed reports provided to NRC by the Department of

Energy's Oak Ridge Institute for Science and Education and the Nuclear Energy Institute (NEI), which represents the nuclear industry. We also examined NRC's efforts to develop a "pipeline" of critically skilled personnel and its need for any new flexibilities and authorities and interviewed NRC managers and NEI executives about the supply and demand for workers with skills critical for fulfilling NRC's mission. Regarding NRC's new reactor licensing activities, we reviewed resource estimate model documents and planning documents and updates. We interviewed managers in NRR and the recently established Office of New Reactors.

We conducted our work from March 2006 through December 2006 in accordance with generally accepted government auditing standards.

Appendix III: New Reactor Licensing

Prior to beginning construction, electric power companies are required to obtain a license from NRC to build and operate a new nuclear reactor or plant. In the past, NRC had a two-step process that required companies to obtain a permit to build a nuclear power plant and then to obtain a license to operate the plant once construction was completed. In 1989, in response to the nuclear power industry's concerns about the significant delays and added costs associated with NRC's review of construction and operating license applications, NRC revised its licensing process to make it quicker and more predictable, with designs less subject to midconstruction, safety-related changes. Specifically, NRC combined construction permits and operating licenses into a single combined license (COL) and created two new licenses—design certifications and early site permits—in 10 C.F.R. Part 52. A COL authorizes the licensee to construct and conditionally operate a nuclear power plant. In addition, NRC has formulated a design-centered review approach (DCRA), which is based on the concept of industry standardization of COL applications referencing a particular design. According to NRC, standardized applications would allow the staff, to the maximum extent practical, to use a “one issue, one review, one position” strategy to optimize the staff's review effort, the resources needed to perform reviews, and the review schedules.

Under Part 52, plant designs are standardized through design certifications. NRC reviews the design, limits on operation, and safety of a particular design; resolves any issues that arise; and then certifies the design through a rule-making process. One goal of the rule-making process is to establish stable plant designs that are not subject to major modifications during the COL application process. This provides more certainty to the applicant and allows NRC to use a single design review to support multiple COL applications. A COL application is a detailed description of the proposed plant's design, operations, site, and environmental impact. Once a design is certified, COL applicants can refer to the associated design certification in their applications and do not have to resubmit the information contained in the certification. COL applicants are not required to reference a design certification, but would then have to submit the design information that would otherwise be in a certification. Another component of the DCRA is the “reference application,” which encourages applicants to use a standard application. Applicants work with the reactor's vendor—for example, Westinghouse or General Electric—to develop a model application that subsequent applicants will use as the basis for their applications. NRC managers and NEI representatives estimate that 65 to 75 percent of the information in additional applications will be identical to the associated reference application. NRC managers stated that each design under consideration will have a reference

application. NRC encourages applicants to use reference applications, but they are not required to do so.

The one aspect not standardized in Part 52 and the DCRA is site-specific factors. Applicants must submit information and assessments that address the safety, environmental impact, and emergency plans of a proposed site. Applicants have the option of providing that information through submitting an early site permit, which allows potential COL applicants to evaluate the suitability of a given site without going through the full COL application process. Once issued, an applicant can reference an early site permit in its COL application and does not have to resubmit the site information. Although COL applicants are not required to reference an early site permit, if that review is not previously conducted, the company would then have to submit the site information that would otherwise be in an early site permit in the COL application.

Design Certifications

NRC has certified four reactor designs to date, two of which electric power companies selected in fiscal year 2006 for their intended COL applications—the AP1000 and the Advanced Boiling Water Reactor (ABWR). As of December 2006, companies had signaled their intent to use two other designs—the Evolutionary Pressurized Water Reactor (EPR) and the Economic Simplified, Boiling Water Reactor (ESBWR).¹ On the basis of previous experience, NRC estimates that new design certifications will take about 30 months and require 120 full-time equivalent (FTE) positions. For each reactor design, table 5 identifies the vendor, certification status, and potential number of COL applications that plan to use this design.

Table 5: Status of Reactor Design Certification, December 2006

Reactor design	Vendor	Design certification status	Number of potential COL applications
System 80+	Westinghouse	Certified	0
ABWR	General Electric, Hitachi, Toshiba	Certified	2
AP600	Westinghouse	Certified	0

¹In December 2005, NRC docketed for review General Electric's design certification application for its ESBWR.

Reactor design	Vendor	Design certification status	Number of potential COL applications
AP1000	Westinghouse	Certified	6
ESBWR	General Electric	Review in progress	3
EPR	AREVA NP	Certification review expected to begin in fiscal year 2008	5
USAPWR	Mitsubishi	Certification review expected to begin in fiscal year 2008	0
Pebble-Bed Modular Reactor	Eskom	Precertification	0
International Reactor Innovative and Secure	Westinghouse	Precertification	0
Total			16

Source: NRC.

Combined Licenses

Electric power companies have submitted letters of intent to NRC, stating that they plan to apply for 20 licenses to build and operate at least 29 new nuclear power reactors in fiscal years 2008 and 2009. NRC estimates that COL applications will take approximately 30 months for the technical review—additional review time and staff resources will be needed for applications that do not reference a certified design. Reference applications that reference an early site permit are expected to require approximately 68 FTEs, whereas subsequent applications are estimated to require approximately 38 FTEs. NRC estimates that reference applications that do not reference an ESP will require 83 FTEs, whereas subsequent applications are estimated to require approximately 53 FTEs. For the 20 expected COL applications, figure 2 identifies the site locations, reactor design, electric power companies or consortia, and number of units.

Appendix IV: Time Line of NRC's Workforce Reorganizations

Since August 2005, NRC has announced several plans to reorganize and restructure its workforce. Previous actions since 2002 include the creation of the Office of Nuclear Security and Incident Response (NSIR) to consolidate security, incident response, and emergency preparedness. As of December 2006, NRC made announcements to take the following actions:

- *August 2005:* NRC announced plans to reorganize NRR to (1) prepare for the increase in the new reactor licensing workload, (2) better align the organization for risk informed regulation, and (3) reduce a layer of executive management to allow an increase in the number of supervisors. In part, the reorganization created the Division of New Reactor Licensing; its implementation was effective October 30, 2005.
- *October 2005:* NSIR established a New Reactor Security Team in its Division of Security Policy devoted solely to new reactor security licensing. In addition, as of September 2006, the Division of Preparedness approved realignment consistent with that of other divisions in NSIR.
- *November 2005:* The Commission approved the reorganization of NSIR to (1) better align and manage the organization consistent with the scope and complexity of current and emergent nuclear security work, (2) enhance organizational effectiveness, (3) improve the supervisory span of control, and (4) restructure the organization consistent with the agency's current human capital management strategy and goals. The reorganization split the Division of Nuclear Security into two divisions: the Division of Security Policy and the Division of Security Operations, each having two deputy directors. Included in the approved reorganization is a new division-level structure with five to six branches reporting to each division, with multiple teams. The reorganization was implemented on February 19, 2006.
- *April 2006:* The Commission approved the initial approach to NRC's Construction Inspection Program, which creates a dedicated organization with total responsibility for the execution of all construction inspection activities across the country, and approved its location in region II's offices in Atlanta, Georgia. In July 2006, the Commission approved the creation of a Deputy Regional Administrator for Construction in region II. The organization began operations on October 1, 2006.
- *April 2006:* NRC's Office of General Counsel implemented a reorganization to provide increased focus and attention to new reactor licensing, creating a Division of New Reactor Programs.

- *July 2006:* NRC announced plans to reorganize its Nuclear Materials Safety and Safeguards and Office of State and Tribal Programs to combine activities that deal primarily with materials licensing, rulemaking and decommissioning under a new Office of National Materials. Nuclear Material Safety and Safeguards' responsibilities include the nuclear fuel cycle's processing, transportation, and spent fuel storage and disposal. The reorganization was implemented on October 1, 2006.
- *August 2006:* The Commission approved the creation of the Office of New Reactors, in response to dramatic growth in this program and to improve the span of control and organizational focus on new reactor licensing, while ensuring that appropriate focus is maintained on the safety of operating reactors. The Office of New Reactors is to be initially staffed with about 230 personnel by January 2007, and about 440 by July 2007.¹ Five NRR branches are expected to migrate to the Office of New Reactors, including reactor planning and scheduling, reactor infrastructure guidance development, reactor environmental projects, and two branches associated with three reactor designs.

In addition to these actions, as of August 2006 the Office of Administration had added procurement, space management, and regulatory support staff; reorganized its Division of Facilities and Security; and was planning to reorganize the Division of Contracts to support the growth in new reactor licensing work.

¹NRC is maintaining a level of flexibility in its staffing plan so that adjustments can be made as the staff gains experience in performing new reactor licensing reviews, according to NRC managers.

Appendix V: NRC's Use of Human Capital Flexibilities, Authorities, Tools, and Programs

NRC carries out many of its human capital programs under the authority of section 161(d) of the Atomic Energy Act of 1954.¹ While section 161(d) directs NRC to comply with classification and associated pay provisions of Title 5 of the *United States Code*, NRC is authorized to depart from them to the extent necessary to discharge its responsibilities, within certain prescribed limits. This authority allows NRC flexibility in various areas, such as recruitment and retention incentives, details to other positions in the agency, and setting pay for entry-level scientific and technical personnel. Some of NRC's human capital programs are authorized under laws that also apply to other federal agencies, such as the Federal Workforce Flexibility Act of 2004² and certain provisions of Title 5.³ The Energy Policy Act of 2005⁴ gave NRC additional human capital flexibilities. In August 2006, 32 of the 45 NRC managers we surveyed assessed the value of each of these flexibilities, authorities, tools, and programs (referred to as flexibilities) in recruiting, hiring, developing, and retaining employees. Table 6 shows the number of survey respondents who rated each of NRC's flexibilities as "very to extremely valuable," or "not at all to moderately valuable," or "do not use."

Table 6: NRC Managers' Assessment of the Use of Human Capital Flexibilities, Authorities, Tools, and Programs

Flexibility, authority, tool, or program	Definition	Number of respondents, by rating category		
		Very to extremely valuable	Not at all to moderately valuable	Do not use
Advances in pay	Used for newly appointed employees, advance payment of basic pay for no more than two pay periods. Typically is used for recent college graduates to assist in moving to a new location and associated costs.	12	8	10
Awards	Cash awards, honorary awards, informal recognition awards, and time-off awards may be given to federal employees to recognize employee and group performance.	28	4	0
Childcare on-site, headquarters	An on-site childcare center to provide employees with the opportunity to balance career and family.	15	7	10

¹42 U.S.C. § 2201(d).

²Pub. L. No. 108-411.

³For example, 5 U.S.C. § 5524a (authorizing advances in pay for newly appointed employees, 5 U.S.C. § 4503 (authorizing cash awards), and 5 U.S.C. § 3109 (authorizing employment of experts and consultants).

⁴Pub. L. No. 109-58.

**Appendix V: NRC's Use of Human Capital
Flexibilities, Authorities, Tools, and Programs**

Flexibility, authority, tool, or program	Definition	Number of respondents, by rating category		
		Very to extremely valuable	Not at all to moderately valuable	Do not use
Childcare tuition assistance	Appropriated funds (from salaries and expenses) used to assist lower income employees with the costs of child care.	8	10	10
Cooperative Program (Student Career Experience Program)	A formally structured program for college or university students pursuing undergraduate or graduate degrees that allows them to alternate semesters of work and study.	24	8	0
Details	A personnel action that temporarily assigns employees in 120-day increments to other positions within the agency. This provides additional work experience and exposure for the employee.	21	10	0
Differing Professional Opinions Program	An internal NRC program that seeks to engender an environment in which employees feel comfortable contributing alternative professional theories or opinions and are safe from retaliation.	16	15	0
Direct hire authority	An OPM-granted authority that expedites the hiring process. This authority currently is not available to NRC.	16	2	13
Early replacement hiring (double encumbering)	Typically used with employees who plan to retire. Allows NRC to hire someone for a position not yet vacated to ensure the continuity of critical skills.	27	5	0
Employee assistance program	Provides a range of confidential services, including counseling and referrals, to employees experiencing such personal problems as work and family pressures; substance abuse; or financial problems that can adversely affect performance, reliability, and personal health.	21	10	0
Developmental assignments and employee rotations	Internal rotations and/or developmental assignments that allow employees to work in another office or position on a temporary basis as well as to fill workforce gaps.	26	6	0
Employment of experts/consultants	The excepted service appointment is used to hire experts and consultants to perform expert or consultant work that is temporary (not to exceed 1 year) or intermittent.	23	8	1
Fitness center on-site, headquarters	An on-site fitness center with gym equipment, nutritional counseling, and health programs to promote work/life balance.	13	8	9
Flexible and compressed work schedules	Allow variations in starting and ending times or allow employees to complete the basic 80-hour biweekly work requirement in fewer than 10 workdays.	27	4	0
Formal training and development	NRC has a training and development program that incorporates external and internal training, self-paced learning, and formal developmental and qualification programs.	31	1	0

**Appendix V: NRC's Use of Human Capital
Flexibilities, Authorities, Tools, and Programs**

Flexibility, authority, tool, or program	Definition	Number of respondents, by rating category		
		Very to extremely valuable	Not at all to moderately valuable	Do not use
Graduate fellowship program	A developmental program used to recruit, retain, and develop technical experts through experience and advanced degrees in specialized engineering and scientific disciplines. Entails a minimum 9-month period of work at NRC, pursuit of a graduate education, and permanent return to the agency in a position that uses the learning gained through graduate study.	15	13	3
Grants to schools	Authorized in the Energy Policy Act of 2005. Allows the agency to provide grants to universities and college with programs and research that support NRC's mission.	4	10	16
Healthcare on-site, headquarters	An on-site health clinic staffed with nurses and a doctor to promote work/life balance.	18	8	5
Honor Law Graduate Program	A 2-year program for graduating law students or judicial law clerks with high academic credentials featuring 6-month rotations through different divisions in the Office of General Counsel and additional training.	13	2	16
Implementation of federal leave programs	NRC has the authority to administer leave and excused absences, with regard to NRC work requirements and the concerns of individual employees. For example, NRC can grant employees annual leave at the beginning of the year or advanced sick leave in appropriate situations or accommodate employees' personal needs through leave programs.	25	5	0
Intergovernmental Personnel Act assignments	Temporary (e.g., 2-year) assignments from and to state and local governments, colleges and universities, tribal governments, and other not-for-profit organizations made for the mutual benefit of the federal government and the nonfederal entity.	1	21	7
Knowledge management/ knowledge transfer	NRC's framework to integrate new and existing approaches for generating, capturing, and transferring knowledge relevant to the agency's mission.	24	8	0
Leadership Potential Program	A 12-month, part-time program to prepare employees for team leader and supervisory roles, or other positions requiring supervisory, managerial, and leadership skills.	29	3	0
Nuclear Safety Professional Development Program	A 2-year developmental program, open to entry-level applicants with high academic credentials, featuring structured coursework, formal and informal training events, and tailored developmental assignments to expose participants to the range of regulatory activities NRC performs.	31	1	0
Other special employment	Special employment programs to facilitate the recruitment of highly qualified candidates from diverse backgrounds to fill a wide variety of positions and job training opportunities within the agency.	10	9	10

**Appendix V: NRC's Use of Human Capital
Flexibilities, Authorities, Tools, and Programs**

Flexibility, authority, tool, or program	Definition	Number of respondents, by rating category		
		Very to extremely valuable	Not at all to moderately valuable	Do not use
Part-time employment	A part-time work schedule that requires an employee to work at least 16 hours, but no more than 32 hours, weekly. It is typically used to retain employees with critical skills who may otherwise leave the agency.	15	15	1
Pay setting authority	This authority allows NRC to set pay within limits prescribed by its statute. This authority is currently used to set pay, for example, for entry-level science and engineering applicants and resident inspectors.	23	5	3
Recruitment incentives	Subject to management approval, bonuses of up to 25 percent of employee's pay are available to recruit highly qualified and competitive candidates.	29	3	0
Recruitment tokens/giveaways	Giveaway items used to promote NRC at recruiting events.	6	26	0
Re-employed annuitants	Used to obtain staff with knowledge, skills and abilities that would otherwise be difficult to obtain. This tool allows the agency to rehire, at full salary, employees who have retired from civil service.	a	a	a
Referral awards	The referral award provides employees with a monetary award if candidates referred to NRC are hired.	14	16	1
Relocation incentives	One-time bonuses up to 25 percent of basic pay that are offered to relocate new or existing employees in difficult-to-fill positions.	29	3	0
Retention incentives	Authorized additional percentage of pay to retain employees with knowledge, skills, or abilities that would otherwise be difficult to fill.	14	13	5
Salary exceptions	Special pay flexibility to appoint employees with superior qualification to a higher step rate above the first step of their grade.	24	6	2
Schedule variations for training	Alteration of work schedules to accommodate training.	15	11	3
Scholarship and Fellowship for Service	Scholarships or fellowships available to students pursuing degrees in a field of study that is a mission-critical skill area—contingent upon an agreed period of service at NRC.	10	5	14
Service credit for annual leave	Allows the agency to grant a newly appointed or reappointed employee credit for prior work experience that would otherwise not be creditable for the purpose of determining the employee's annual leave accrual rate.	23	4	3
Senior Executive Service Candidate Development Program	A program providing high potential GG-14 and above employees with training and developmental activities that prepare them for future positions as senior executives within the agency.	29	3	0

**Appendix V: NRC's Use of Human Capital
Flexibilities, Authorities, Tools, and Programs**

Flexibility, authority, tool, or program	Definition	Number of respondents, by rating category		
		Very to extremely valuable	Not at all to moderately valuable	Do not use
Special rate schedules or administratively determined rates	Under its statutory authority, NRC can establish rates for scientific and technical positions above the regular general schedule rates, within prescribed limits. (See also pay setting authority.)	19	9	3
Student loan repayments	An incentive authorizing the repayment of student loans.	21	10	1
Summer hire program (Student Temporary Employment Program)	Through this program, college and high school students have the opportunity to work at NRC—typically during the summer to gain exposure to career opportunities at the agency.	24	8	0
Lodging and transportation expenses for student employees	In some cases, NRC may offer to pay lodging, transportation, and subsistence expenses for students working for the agency, through the Student Temporary Employment Program and the Student Career Experience Program.	20	9	3
Team Leader Development Program	A part-time program that typically lasts 12 months to develop the agency's team leaders for supervisory or other positions requiring supervisory, managerial, and leadership skills and abilities, with training and development opportunities comparable to the Leadership Potential Program.	b	b	b
Telecommuting (telework)	A recruitment and retention tool that provides some employees with flexible work arrangements. Telecommuting can occur on a project-based or fixed schedule, from home or through an official Federal Telecommuting Center.	17	15	0
Undergraduate Scholarship Program	This program provides tuition, fees, and books for a limited number of college seniors who participated in NRC's Cooperative Program and obligates recipients to a specified period of employment with NRC.	12	6	13
Visiting fellows	Used to supplement NRC expertise in medicine, health physics, engineering, and other professional (e.g., legal) and scientific disciplines by employing visiting fellows who can contribute to NRC's mission.	3	11	15
Voluntary leave transfer	Allows other federal employees to donate annual leave to an employee who has a personal or family medical emergency and who has exhausted his or her own leave.	16	15	0
Voluntary Separation Incentive Payments and Voluntary Early Retirement Authority	Voluntary Separation Incentive Payments and Voluntary Early Retirement Authority help agencies complete major downsizing with minimal workforce disruption.	11	17	3
Waiver of dual compensation limitations	Using this authority, NRC can waive the salary "offset" required when reemploying retired Federal employees who receive a federal pension.	23	4	4

**Appendix V: NRC's Use of Human Capital
Flexibilities, Authorities, Tools, and Programs**

Flexibility, authority, tool, or program	Definition	Number of respondents, by rating category		
		Very to extremely valuable	Not at all to moderately valuable	Do not use
Waiver of time in grade	Director of OHR may approve exceptions to the rate of promotion upon written request by office directors or regional administrators.	11	16	4

Source: Results of GAO survey of 32 NRC managers.

Note: Responses may not total 32 because some managers did not respond to every question.

*NRC discontinued use of this flexibility in 2006 in favor of the pension offset waiver.

*NRC began this program in 2006.

Appendix VI: Comments from the Nuclear Regulatory Commission



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 10, 2007

CHAIRMAN

Mr. James E. Wells, Jr.
Director, Natural Resources
and Environment
U.S. Government Accountability Office
441 G Street, NW
Washington, D.C. 20548

Dear Mr. Wells:

On behalf of the U.S. Nuclear Regulatory Commission (NRC), I am responding to your letter by email dated December 12, 2006, requesting NRC review and comment on your proposed report entitled, "Retirements and Anticipated New Reactor Applications Will Challenge NRC's Workforce" (GAO-07-105). We appreciate your providing the NRC the opportunity to review this draft report, the time and effort you and your staff have invested in reviewing this important topic, and the care that you have taken to ensure that your report is constructive and accurate.

Overall, the NRC considers the draft report to be comprehensive, fair, and balanced. The report is well written and provides an accurate reflection of the review. Ultimately, the NRC believes the findings, conclusions, and recommendations of the report to be very constructive.

The report accurately identifies challenges that the agency faces in meeting an anticipated increased workload while coping with replacing retiring workers and adding new staff with critical skills. The agency is aggressively taking steps to address these challenges. As you are aware, however, since the report was written, the two Incoming Appropriations Committee Chairmen, Senator Robert Byrd and Congressman David Obey have announced their intention to complete a full-year FY 2007 Continuing Resolution (CR) with very few exceptions. This would mean a \$95 million reduction in the level of funding expected by the NRC compared to the level approved by the full House and the Senate Appropriation Committee for FY 2007, and absorbing a cut of this magnitude is exacerbated by the fact that we are already three months into the fiscal year. Currently, we are considering how the NRC can adapt to this prospect with the least damage, while we are also requesting that we be an exception. However, we can assure you that the funding and full-time equivalent (FTE) restrictions under a full-year CR at the FY 2006 level would have a crippling impact on our ability to manage human capital.

For instance, a full-year CR will likely have a disastrous impact on our ability to avail ourselves of the beneficial tools developed in the Energy Policy Act of 2005 (EPAct). It will also seriously damage our ongoing efforts to build additional bridges to colleges and universities, including Minority Serving Institutions (historically black colleges and universities, Hispanic serving institutions, and tribal colleges and universities).

**Appendix VI: Comments from the Nuclear
Regulatory Commission**

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We will try to protect current employees, but operating under a Continuing Resolution will result in significant curtailment, if not cessation, of new hiring, except for those already given offers and those necessary for the most critical of skills. The funding impacts will also permit only essential travel and training. As such, non-essential rotational opportunities, an important training tool particularly for new employees, will have to be eliminated.

These are but a few examples of anticipated adverse impacts should the agency be forced to operate at the FY 2006 budget level for the entire fiscal year 2007. Such a scenario will seriously imperil the agency's ability to meet our human capital goals and to manage the enormous demographic transition underway as our most experienced employees retire. Such a scenario will also result in enormous inefficiencies elsewhere in our programs and would seriously challenge our ability to meet our agency performance objectives.

The enclosure provides some minor comments for your consideration. We greatly appreciate the report and its findings, conclusions, and recommendations. We hope that we can implement many of its proposals and fully use the tools given to us through EAct should Congress restore us to the House and Senate approved funding levels for fiscal year 2007. Should you have questions about these comments, please contact me directly, or our Director of Human Resources, Mr. James F. McDermott, at (301) 415-7516.

Sincerely,



Dale E. Klein

Enclosure:
NRC's Minor Comments on Draft
GAO-07-105

Appendix VII: GAO Contact and Staff Acknowledgments

GAO Contact

Jim Wells, (202) 512-3841 or wellsj@gao.gov

Staff Acknowledgments

In addition to the individual named above, Richard Cheston (Assistant Director), Sarah J. Lynch, Katherine Hudson Walker, Nancy Crothers, Brandon Booth, William Doherty, Cindy Gilbert, and Doreen Feldman made key contributions to this report.

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